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ABSTRACT

This bibliography is intended to provide a source of information on what has been written on science and mathematics education in Africa until August 1967. The works included range from the level of the post-graduate thesis to articles in local teaching journals covering a range of topics from sophisticated research to teachers talking among themselves about their problems. Material selection for the bibliography is restricted to African countries in which English is the medium of instruction. The bibliography has two major divisions, science and mathematics, and each has been further divided by geographical area. Appendices include author and subject indices, a key to the libraries and institutions in which the materials may be found, and a list of the bibliographies, catalogs, and libraries searched in compiling this publication. Some pages are marginal in legibility. (PR)

UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION

ED052949

ANNOTATED BIBLIOGRAPHY ON SCIENCE AND MATHEMATICS EDUCATION IN SUB-SAHARAN AFRICA

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Preface

The promotion of the exchange of information about science education, both internationally and within a particular region of the world (Africa, Asia, Latin America and the Arab States) is an important part of Unesco's programme to develop and improve science education at all levels. To this end, Unesco is producing a series of documents and publications which provide information about recent and current thought and action in this field. The Annotated Bibliography on Science and Mathematics Education in Sub-Saharan Africa is one such document. It is presented as a contribution to the promotion of the exchange of information in a field which is, as yet, poorly documented.

As a first listing the bibliography does not attempt to be complete. The selection of material is restricted to countries in Africa in which the medium of instruction at school or university level is English. The author's introduction and annotations also refer exclusively to such countries. The author's choice of material and the opinions expressed in annotations do not necessarily reflect Unesco's views. It is hoped that the bibliography will be helpful to leaders of science education in African countries, and to those elsewhere in the world who are interested in this field, in locating valuable material, produced by **pioneers** of modern science education in Africa, which might otherwise be overlooked or completely lost.

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General
    Science and Mathematics (g)

Science
    Eastern Africa (es)
    Central Africa (cs)
    Southern Africa (ss)
    Western Africa (ws)

Mathematics
    Eastern Africa (em)
    Central Africa (cm)
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    Western Africa (wm)

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INTRODUCTION

Concern with science and mathematics education in Africa is not new. With the exceptions of English, agricultural and religious subjects, science and mathematics have come near the top of the list of educational priorities in Africa for at least the past thirty or forty years. Prior to this time the educational efforts of local governments and missions were directed toward the more directly practical aspects of education on a local level.

With the advent of more universal standards of education and control by bodies outside the local school, more and more concern has been directed towards the use of the school as a mechanism for fulfilment of the aspirations for national development by the powers in control. In the present day and age it is understandable that the governments of the newly formed nations in Africa, in their desire to push forward development, should give the highest educational priority to science and mathematics subjects.

There are, however, several problems which have been faced and are being faced both by teachers and those persons who are charged with the training and guidance of teachers and with curriculum development. On the one hand, the teacher must cope with the problem of teaching his subject, with all of its inherent cultural biases, to persons who were raised in a cultural situation possibly different from both that of the teacher and the subject. On the other hand, those persons who are charged with the training and guidance of teachers and with curriculum development are faced with the translation of the expressed abstract desires for national development into some form of concrete and operational scheme which can then be utilized practically. Within the past few years large amounts of money have been spent in the attempt to relate science and mathematics education in these countries to their national aspirations and to make the teaching of these subjects more relevant and harmonious with respect to the cultural background of their peoples.

Over the past six or seven years in particular, science and mathematics education in Africa has been in a state of ferment. Various attempts at curriculum reform are being carried out, science and mathematics teachers are forming associations with the aim of increasing communication and professional standards, and international conferences are being held to discuss problems in development.

In Africa today, there is a rapid turnover in expatriate personnel concerned with education, an exponential increase in the training of locally based teachers, and a desire upon the part of the newly formed universities and educational institutions to carry out research and curricular reforms. Access to material on science and mathematics education or at least a knowledge of what has been done in science and mathematics education should be among the first concerns of individuals, groups, or institutions which wish to do work in these areas in Africa.

Very little research into problems of science and mathematics education has been done in Africa. Material has been written by persons with varying degrees of sophistication and insight, ranging from the practical level of the local teacher to the more abstract levels of the national or international planning conference.

This bibliography was begun some time ago as a private study to lay the ground for further work in science and mathematics education in Africa. As the work proceeded it became increasingly obvious that, in addition to the paucity of information, there was an even greater lack of communication of this information between those directly concerned on all levels. A few individuals and organisations had, in some respects, large amounts of information but access to this information was difficult.

In its present form, this bibliography is an attempt to provide a source of information on what has been written on science and mathematics education in Africa. The works which are listed range from the level of the postgraduate thesis to articles in local teaching journals; from sophisticated research to teachers talking among themselves about their own problems. For those who are interested in research, some of the sources should help to define more clearly the boundaries of their problems. It is perhaps unfortunate that the immediate problems of the teachers are most often neglected. Many of the articles in local teachers journals point out these problems. It is also helpful for a new teacher coming into a country, or for a locally based teacher, to be able to locate material which can assist him with his immediate problems.

It is hoped that, with the information provided in this bibliography, communication between individuals, groups, and institutions working in various parts of Africa may be enhanced. In this day when such vast amounts of money are being expended on educational development it is becoming increasingly important that, where possible, duplication of effort and research be kept to a minimum. It is also hoped that there will be an increasing sense of 'archivemanship' within the national libraries and institutions concerned with science and mathematics education.

PLAN OF THE BIBLIOGRAPHY

In the first instance, the bibliography is broken down into the two major divisions of science and mathematics. Each of these divisions is in turn broken down by geographical area. These are primarily divisions of convenience and are not intended to have any physical or political significance. If the reader is interested in the work done in a particular country or area he should first refer to the appropriate section. In some instances references to a particular area will be found in the general reference section.

It has been found convenient to index materials which are attributable to a particular science or mathematics teachers' association and certain other organisations under the name of that organisation rather than as anonymous works. These are the only cases of an internal subject breakdown other than as indicated above. It was also found convenient to provide a limited amount of internal referencing through the use of See and See also references.

An author index is found in Appendix 1 and a subject index is found in Appendix 2. The subject index is intended as a guide only. Its shortcomings, will, it is to be feared, become readily obvious to the user. However, after spending countless hours scanning bibliographies and catalogues which were not indexed, it was decided to at least make an attempt at compiling an index.

An attempt has been made to provide information as to where works listed may be found. A key to the libraries and institutions in which the materials may be found is given in Appendix 3. Appendix 4 lists the library and institutional holdings for some of the more important works which are referred to in the bibliography. In addition, occasional reference to where an item may be located is made within the body of the bibliography. This reference is made through the use of code letters to the right of the reference.

Appendix 5 lists the bibliographies, catalogues, and libraries searched in the process of compilation of this work. It is hoped that the list will assist anyone who wishes to make a further search of the literature in the future.

Finally, you should note that this is not a definitive work. Every attempt has been made at accuracy and completeness but errors will undoubtedly have crept in. The general cut off date for material included is August 1967, with the exception of Southern Rhodesia which is November 1965.

EXPLANATORY NOTES

Where possible, an attempt has been made to follow the format rules as laid down in Bibliographical Procedures and Style - A Manual for Bibliographers in the Library of Congress, Blanche Prichard McCrum and Helen Dudenbostel Jones, Library of Congress, 1954. However, the user should note the following points:

1. The code letter/number found to the immediate left of an entry indicates the general subheading area by the letter and the successive entry number under that particular subheading.

2. A double dashed entry, ----- -----, indicates successive author entries.

3. Entry is under title for anonymous works.

4. Translations and 'discovered' titles are to be found in brackets, [ ]. The user should be warned that there a few under 'discovered' authors which are not in brackets.

5. Volume, number, date and pages are given, where known, in standard format. It should be noted however that in one instance the date is given as 1965(y). In this case the date has been 'discovered' and the only means of identifying the particular issue is by the colour of its cover - which is yellow.

6. If there is a question of uncertainty about any of the information, a question mark in parenthesis, (?), immediately follows the questionable information.

7. For some entries, code letters appear to the lower right hand side of the entry. A key to the code letters is given in Appendix 3. These code letters indicate the libraries or institutions which hold the item in question.

8. The annotations provided should, at all cost, be read in the light of the rest of the information provided in the main body of the entry, especially title, location, and date. In many instances the annotation is merely a terse listing of the subject headings contained within a particular article. This was necessitated by the magnitude of the work involved and in some instances the amount of time which was available. Although the author is in disagreement with some of the ideas put forth an attempt has been made to avoid an evaluative treatment.

ABBREVIATIONS

Africa Ed.	Africa Education
A-level	Advanced level (School Certificate)
A.G.M.	Annual General Meeting
A.I.D.	Agency for International Development
A.S.E.C.A.	Association for Science Education in Central Africa
A.P.S.P.	African Primary Science Program
Colonial Rev.	The Colonial Review
comp.	compiler
C.R.E.D.O. (now C.E.D.O.)	Centre for Curriculum Renewal and Educational Development Overseas, U.K.
E.A.	East Africa
ed.	editor
E.D.C.	Educational Development Center, U.S.A.
E.M.O.Y.O. Project	Exploring Mathematics on Your Own Project
E.S.I.	Educational Services Incorporated, U.S.A.
F.A.O.	Food and Agriculture Organization
Fed. Sci. Teach. J.	Federal Science Teachers' Journal
F.S.K.	Future Scientists of Kenya
F.S.T.A.	Federal Science Teachers' Association
G.A.S.T.	Ghana Association of Science Teachers
G.A.S.T. Bull.	Ghana Association of Science Teachers Bulletin
Ghana Teach. J.	Ghana Teachers' Journal
H.S.C.	Higher School Certificate
I.B.E.	International Bureau of Education
illus.	illustration, -s
Int. Rev. Ed.	International Review of Education
J.C.	Junior Certificate
J. Chem. Ed.	Journal of Chemical Education
Jour. of A.S.E.C.A.	Journal of the Association for Science Education in Central Africa
Jour. of Ed. (Sierra Leone)	Journal of Education (Sierra Leone)
J. Res. in Sci. Teach.	Journal of Research in Science Teaching
J.S.C.	Junior School Certificate
J.S.S.L.E.	Junior Secondary School Leaving Examination
Kenya Ed. J.	Kenya Education Journal
K.S.T.A.	Kenya Science Teachers' Association
K.S.T.A. Bull.	Kenya Science Teachers' Association Bulletin
M.A.G.	Mathematical Association of Ghana
Makerere J.	Makerere Journal
Malawi Sci. Teach.	The Malawi Science Teacher
M.A.T.	Mathematical Association of Tanzania
mimeo.	mimeographed (duplicated)
Min. of Ed.	Ministry of Education
M.S.T.	Malawi Science Teacher
n.d.	no date given (or known)
Nigerian Teach.	The Nigerian Teacher
no.	number

n.p.	no place of publication given (or place of publication not known)
N. Rhod. Af. Ed. J.	Northern Rhodesia African Education Journal
N.S.T.C.	Nairobi Science Teaching Centre
N.U.T.	National Union of Teachers (Ghana) or Nigerian Union of Teachers
O-level	Ordinary level (School Certificate)
O.V.A.C.	Overseas Visual Aids Centre, U.K.
Oversea Ed.	Oversea Education
p.	page, -s
Proc. of S.D.S.T.A.	Proceedings of the Salisbury and District Science Teachers' Association
pub.	publisher
S.C.	School Certificate
Sci. Ed.	Science Education
Sci. Newsletter	Science Newsletter
Sci. Teach. (U.K.)	The Science Teacher (U.K.)
Sci. Teach. Jour.	Science Teachers' Journal
S.D.S.T.A.	Salisbury and District Science Teachers' Association
S.P.	Sessional Paper
S.T.A.M.	Science Teachers' Association of Malawi
S.T.A.N.	Science Teachers' Association of Nigeria
S.T.A.R.T.	Science Teachers' Association of the Republic of Tanzania
S.T.A R.T. Jour.	Science Teachers' Association of the Republic of Tanzania Journal
S.T.C.	Science Teaching Centre
Tanzania Ed. J.	Tanzania Education Journal
T.C.	Teachers' College
Teach. Ed.	Teacher Education (London)
Times Ed. Supp.	Times Educational Supplement
U.B.B.S.	University of Bechuanaland, Basutoland, and Swaziland
U.B.L.S.	University of Bechuanaland, Lesotho, and Swaziland
Uganda Teach. J.	Uganda Teachers' Journal
U.M.A.T.T.	United Missionary Air Training and Transport
Unesco	United Nations Educational, Scientific, and Cultural Organization
Unesco Chron.	Unesco Chronicle
U.S.I.S.	United States Information Service
U.S.T.A.	Uganda Science Teachers' Association
v.	volume, -s
var. pagination	variable pagination
W.A.	West Africa
W.A.E.C.	West African Examinations Council
W.A.S.C.	West African School Certificate
West Af. J. of Ed.	West African Journal of Education
West Af. Rev.	West African Review
Z.A.S.E.	Zambia Association for Science Education

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I would like to express my appreciation to all those persons and institutions without whose assistance this work would not have been possible. As is stated elsewhere, part of my notes have been lost and consequently any listing will be incomplete. However, I would like to thank the following persons for their help and encouragement:

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In addition, I would like to express my appreciation to Dave Giltrow for his unconscious uplifting which made the earlier parts of this work possible. I only wish I could say I had returned his kindness.

Lastly, I would like to thank my wife who has both labored and tolerated long with little return. Words of appreciation become meaningless at this point.

John H. Case
Lusaka, Zambia, 1970

SCIENCE AND MATHEMATICS: GENERAL

Abidjan Conference - 1960

See Unesco. Conferences and Meetings. Abidjan Conference (1960) and Associated Documents.

Addis Ababa Conference - 1961

See Unesco. Conferences and Meetings. Addis Ababa Conference (1961) and Associated Documents.

g 1 Adiseshiah, Malcolm S.
The Lagos plan for scientific research and training in Africa.
Unesco Chronicle, v. 10, no. 10, Oct. 1964: 317-321.
CL, GU, IEN, L,
LC, LIE, NN

A summary report by the Deputy Director General of Unesco on the International Conference on the Organisation of Research and Training in Africa in relation to the study, conservation and utilization of natural resources. The conference directed its attention specifically to the development of scientific research and the encouragement of science in African society. A proposed plan involves action at three levels - national, continental, and international.

A.P.S.P.

See Educational Development Center Inc. African Education Program. African Primary Science Program.

g 2 Ayivor, V. F. K.
Science curriculum suitable for middle schools.
Sci. Teach., v. 9, no. 2, Dec. 1965: supp. pages i-viii.

Winning Ghanaian article for the 1965 Guinness Awards.

g 3 Bishop, George
Science textbooks for African schools - a guide for authors.
Unesco Regional Centre for Educational Information and Research in Africa, Accra, Occasional Paper No. 1, 1965.
16 p. ed. by E. H. Ward.
LIE

Planning the textbook; criteria of selection; scientific attitude and method; the discovery approach and experiment by the pupils; the concentric plan; the 'project' approach; style; diagrams and illustrations; format; exercises and questions; the teacher's manual.

g 4 Cessac, J., ed.
Science teaching in the secondary schools of Tropical Africa.
Unesco (NS.62/D, 27/A), Paris, 1963. 79 p. tables.
LC, LIE, MAK, UCD

An analysis of the present position and of the needs of science education in the various states and territories of Tropical Africa, together with suggestions as to how present-day conditions might be improved. Based on the Abidjan meeting on the teaching of science in Tropical Africa, Dec. 1960.

g 5 Chaplin, Basil, H. G.
Comments on leading papers commissioned by the second Commonwealth conference.
University of Ghana Science Education Research Unit, n.d.
3 p. mimeo.
RCA

g 6 ----- -----
The development of African elementary science education.
n.p., 1963. 4 p. mimeo.
LIE[1]

Notes with special reference to the type of aid which might be provided by organisations like E.S.I. (now E.D.C.). Summary of needs (immediate and long term); overall requirements; suggestions; important factors in the implementation of aid to science education in Africa.

g 7 ----- -----
Notes on the present Elementary Science Study (Educational Services Inc., U.S.A.) in relation to elementary science in West Africa.
n.p., 1963. 7 p. mimeo.
LIE[1]

g 8 ----- -----
Notes on the presentation of elementary science material by sequence pictures.
Overseas Visual Aids Centre (O.V.A.C.), London, Bulletin No. 8, Oct. 1963: 1-9.
OVA, RCA

Why sequence picture presentation is useful, use of the materials, and suggestions for use in the design of sequence picture materials. A sequence on 'gases' is used in illustration.

[1] Note: Articles (g 6) and (g 7) above are listed together in the library of the Institute of Education, University of London.

g 9 Chaplin, Basil H. G.
Research and replanning of science education.
National Union of Teachers, (Ghana) n.d. 15 p. mimeo.

Paper read to the annual conference of the N.U.T.

g 10 Commonwealth Conference on the Teaching of Science in Schools.
School science teaching. Report of the Commonwealth Conference on the Teaching of Science in Schools, University of Ceylon, Peradeniya, Ceylon, 9 Dec. to 21 Dec. 1963.
Commonwealth Education Liaison Committee, London, 1964. 140 p.
LIE, MAK, MIE, UCD

Note: Materials on this conference are available from the Education Division of the Commonwealth Secretariat (formerly Commonwealth Education Liaison Committee), Marlborough House, Pall Mall, London, S.W. 1, England.

Commonwealth Conference on the Teaching of Science in Schools. 1963.

See also: Banage, W. B. (es 8);
Bassey, E. E. (ws 15);
Kane-Mensah, J. J. (ws 163);
Kenya, *Ministry of Education* (es 100);
Nigeria, The Delegation (ws 208);
Onabamiro, S. D. (g 57).

g 11 Cope, George
African elementary science conference at Kano.
Educational Services Inc., Quarterly Report, summer/fall 1965: 113-116.
Photographs.
MCM, MWC

g 12 ----- -----
African mathematics program.
Educational Services Inc., Quarterly Report, summer/fall 1965: 117-120.
Photographs.
MCM, MWC

g 13 Dei Anang, M. F. and Kweku Donko
Should science or classics take first place in an African curriculum.
Colonial Review, v. 1, no. 1, Feb. 1939: 6-7.
Condensed from an article in the West African Review, Aug. 1938.
CLU, E, IEN, L, LC, LIE, NC, NN

E.D.C.

See Educational Development Center Inc.

g 14 Edney, E. B.
The value of biology in education.
Oversea Ed., v. 15, no. 2, 1943/1944: 52-62.
LC, LIE

EDUCATIONAL DEVELOPMENT CENTER INC.

Formerly known as Educational Services Inc. or E.S.I.
Also known as E.D.C.

African Education Program - General

g 15 Educational Services Inc.
An African Education Program.
In Educational Services Inc. A review of current programs. 1965. Educational Services Inc., Watertown, Mass., 1965: 43-47, 77-78.

General description of the background of the program followed by a brief report on the African Mathematics Program and the African Elementary Science Program Kano Conference, Feb. 22-26, 1965.

g 16 ----- -----
African Education Program.
E.S.I. Quarterly Report, summer/fall 1964: 16-18.
MCM, MWC

Brief report on activities in mathematics and the initiation of activities in science.

g 17 ----- -----
African summer study. M.I.T. - Endicott House. June 19 - July 29, 1961. Draft of general report.
Educational Services Inc., Watertown, Mass., Sept. 1961. (In seven parts.)

Report of the Endicott House Conference which brought the E.S.I. African Education Program into being. The report is in seven sections:

1. Organisation, summary, participants.
2. Mathematics:
    - (a) Report of subgroup on mathematics curriculum.
    - (b) Excerpts from statement by C. O. Taiwo, chairman of subgroup on mathematics curriculum.
    - (c) General problem of a curriculum.
3. Science:
    - (a) Report of subgroup on science curriculum.
    - (b) Science education in Africa (Dr. S. O. Awokoya).
    - (c) Excerpts from remarks on science curriculum.
    - (d) Outline of a tentative secondary school science curriculum.

4. Humanities and social studies.
5. Languages.
6. Teacher training.
7. Proposed international institute.

g 18 Educational Services Inc.
A report of an African Education Program.
Educational Services Inc., Watertown, Mass., Feb. 1965. 51 p.

This preliminary program review presents the program in the development of the 'new mathematics' and the 'new science' as it has been developed for and adapted to African circumstances. Special attention is devoted to language-related problems which arise in science and mathematics curricula in Africa.

See also: Nichols, B. (g 54);
Okosi (g 55);
Oyelese, John O. (g 61);
Solaru, T. T. (g 72);
Ukeje, O. (g 73);
Zacharias, Jerrold R. (g 98).

g 19 ----- -----
Report of tutor and teacher training courses in Tropical Africa, December 1963 to February 1964.
Educational Services Inc., Watertown, Mass., 4 Mar. 1964.

Report submitted to the Agency for International Development.

African Education Program - General

See also: Martin, W. T. and J. L. Aldrich (g 50).

African Education Program - African Mathematics Program

Also known as Entebbe Mathematics.

g 20 Educational Services Inc.
Progress report to the Agency for International Development on the African Mathematics Program, June 30 to December 31, 1964, A.I.D. contract RES-21.
Educational Services Inc., Watertown, Mass., 31 Jan. 1965. 34 p.

g 21 ----- -----
Progress report to the Agency for International Development on the African Mathematics Program, January 1, 1965 to June 30, 1965 under A.I.D. contract RES-21, amendments 1 & 2.
Educational Services Inc., Watertown, Mass., 30 Sept. 1965. 14 p.

g 22 Educational Services Inc.
Progress report to the Agency for International Development on the African Mathematics Program, July 1, 1965 to November 30, 1965 under A.I.D. contract RES-21, amendment 3.
Educational Services Inc., Watertown, Mass., 30 Dec. 1965.
32 p.

g 23 ----- -----
Progress report to the Agency for International Development on the African Mathematics Program, [Dec. 1, 1965] to April 30, 1966 under A.I.D. contract RES-21, amendment [4].
Educational Services Inc., Watertown, Mass., 31 May 1966.
47 p.

g 24 ----- -----
Report to the Agency for International Development on the 1962 Entebbe Mathematics workshop. Conducted ... under A.I.D. contract PIO/T 899-H-69-AA-3-29034.
Educational Services Inc., Watertown, Mass., 10 Apr. 1963.
MIE

African Education Program - African Mathematics Program

See also: Addy, Lucy (wm 1);
Beninati, A. (em 3);
Cope, George (g 12);
Haag, V. H. (wm 15);
Okosi (g 55);
Oyelese, John O. (g 61, g 62);
Ukeje, O. (em 36, g 73, wm 28).

African Education Program - African Primary Science Program

Also known as A.P.S.P.

g 25 Educational Services Inc.
African Elementary Science workshop, Entebbe, Uganda, 5 July - 13 August 1965.
Educational Services Inc., Watertown, Mass., 1965. 572 p. diags., mimeo.

Part I contains talks given to the whole group of 53 participants and reports of observations made as the new ideas were being tried out in primary schools. Part II outlines 29 primary school activity units in science, with details of equipment which can be made from local materials.

g 26 ----- -----
Report to the Agency for International Development on the Kano Elementary Science Conference. 1965.
Educational Services Inc., Watertown, Mass., 1965.

African Education Program - African Primary Science Program

See also: Chitondo, M (cs 51);
Cope, George (g 11);
Fafunwa, A. Babs and Mike Savage (ws 66);
Goldstein, Jack and James L. Aldrich (g 35);
Kimball, Richard L. (cs 111);
Osiyale, Akindele O. (g 59);
Science Centre, Domasi (cs 193 - cs 200);
Woolman, M. K. (es 293);
Yoloye, E. A. (ws 321);
Zambia Association for Science Education (cs 245).

g 27 Eells, W. C.
American doctoral dissertations on scientific and mathematical education in foreign countries.
Sci. Ed., v. 43, Apr. 1959: 274-275.
NSU, SwU

Entebbe Mathematics

See Educational Development Center. African Education Program - African Mathematics Program.

E.S.I.

See Educational Development Center.

g 28 Fafunwa, A. Babs
Elementary science workshop. August 10 to 30, 1964.

Part I	Proceedings.	55 p.
Part II	Units.	85 p.
Part III	Units.	80 p.

Faculty of Education, University of Nigeria, Nsukka, n.d.
mimeo.
MIE

g 29 ----- -----
Scope and place of science and technology in general education. Papers of the United Nations conference on the application of science and technology for the benefit of the less developed areas.
United Nations (E/CONF/39/K/6), New York, 1962. 7 p.

An examination of the requirements for producing a scientific attitude and providing the scientific knowledge in the citizenry which is required if Africa is to modernize. The nature of the problem and the processes which appear most promising in meeting it are discussed. A proposal for a compulsory functional literacy program, which would include scientific and agricultural education and which might operate in part through a national service movement, is advanced.

g 30 Fehr, Howard F. and Willard J. Jacobson
Report on the teaching of mathematics and science in primary and secondary schools, and on the training of teachers. International Congress on Science Teaching and Economic Growth, Dakar, 14-22 January 1965.
Inter-Union Commission on the Teaching of Science, n.d. 70 p.

Summary of section D of the Congress held by the Inter-Union Commission on the Teaching of Science (a creation of the International Council of Scientific Unions). The report offers suggestions and proposals for a common curriculum in science and for procedures introducing new teaching programs in science, and alludes to paths along which further research is desirable. Contents: science education and economic growth; outline curricula for school science; school mathematics; the training of teachers in science and mathematics; science, mathematics, and economic growth; illustrative themes and topics in school science; programs in mathematics for primary schools; development projects; bibliography.

g 31 Field, M. J.
Science in African secondary education.
Oversea Ed., v. 9, 1937: 1-12
LC, LIE

g 32 Gardiner, Norman and Denis G. Osborne
Biodeterioration of science teaching equipment in the tropics.
Int. Biodeterioration Bull., v. 2, no. 2, 1966: 149-150.

g 33 ----- -----
Deterioration of laboratory equipment in the tropics.
Report to Unesco under contract UNESCO/NS/3026/66. July 1966.
Department of Physics, University College, Dar es Salaam, Research Report Ref. T1/1966, July 1966. 23 p.

Description of a research project to devise better methods for the storage of science apparatus in the tropics. Examples of types of deterioration are given.

g 34 ----- -----
Equipment deterioration, June 1967.
Department of Physics, University College, Dar es Salaam, Research Report Ref. T2/1967, July 1967. 6 p.

Description of the experimental method used in a research project to determine better methods for the storage of science apparatus in the tropics. Some preliminary results are given.

g 35 Goldstein, Jack and James L. Aldrich
The African Elementary Science Program.
E.S.I. Quarterly Report, spring/summer 1966: 71-73.
MCM, MWC

Background and proposed development of the program.

g 36 Gruber, Ruth, ed.
Science and new nations.
Basic Books Inc., New York, 1961. 314 p.
LC, LIE, MAK
UCD, UCN

Proceedings of the Rehovoth Conference (the International Conference on Science in the Advancement of New States) at Rehovoth, Israel, August 1960.

g 37 Haggis, Sheila M.
Adaptation of science teaching in Africa.
In Final Report of the Meeting of Experts on the Adaptation of the General Secondary School Curriculum in Africa, Tananarive, 2-13 July 1962.
Unesco (Unesco/ED/196), Paris, 31 Oct.1962: 49-59.
LIE, RCA

g 38 ----- -----
Africa development demands more teachers.
Sci. Teach., v. 9, no. 2, Dec. 1965: 40-41.

g 39 ----- -----
Notes on practical problems concerning science teaching in Africa.
In The Teaching of Science and Mathematics.
Unesco Regional Centre for Educational Information and Research in Africa, Accra, Occasional Paper No. 3, 1965: 7-11.
In English with French summary.

See also Unseco (g 83).

g 40 ----- -----
Original work in science teaching.
West Af. J. of Ed., v. 3, no. 3, Oct. 1959: 102-104.

Spirit of enquiry must be fostered in secondary school science without neglecting the need for examinations as acceptable qualifications; suggestions for essay topics and practical projects are outlined, using the local environment and including many branches of science.

g 41 Haggis, Sheila M., comp.
A survey of science education in African countries, first cycle, secondary level.
Unesco Regional Centre for Educational Information and Research in Africa, Accra, 1965. 98 p.
MIE

The primary purpose of this study was to provide Unesco with information which would be of use in planning its African aid program in science education. Covers: teachers; the subjects taught; facilities; equipment; teaching materials; teaching syllabuses; teaching methods; examinations; teacher's aims; teacher's professional activities; and teacher training.

g 42 Hammond, S. A.
Biology in African education.
Int. Rev. of Missions, v. 17, no. 67, July 1928: 495-504.
LIE

g 43 Ifaturoti, M. A.
Science in secondary schools.
Oversea Ed., v. 30, no. 3, 1958/1959: 133-135.
LC, LIE

g 44 Igboko, P. M.
Improving school mathematics.
West Af. J. of Ed., v. 11, no. 2, June 1967: 85-88.

Discusses the 'ABC Institutes' of the Entebbe Mathematics Project. The Institutes comprise a program directed towards the improvement of school mathematics at primary school, teacher training college and secondary school levels.

g 45 Ingold, C. K.
The education of a scientist: A lecture delivered in Trenchard Hall, University of Ibadan, in March 1963.
Ibadan University Press, 1963. 11 p.

The author discusses what changes should be taking place in our educational framework to prepare students for life in a 'scientific' and 'technological' age.

Lagos Conference - 1964

See Unesco. Conferences and Meetings. Lagos Conference (1964) and Associated Documents.

g 46 Lauwerys, J. A.
Memorandum on the teaching of science in the dependencies.
n.p., n.d. 4 p. mimeo.
LIE

Aims of science teaching in Africa; types of information which science teachers should deal with; relation of science subjects to other school activities; place of general science in the curriculum; course of work.

g 47 ----- -----
The teaching of general science.
Oversea Ed., v. 8, no. 4, July 1937: 196-204.
LC, LIE

A plea for a new approach to general science teaching, showing science as a way of tackling specific problems, relevant to the experience of the pupils; balance should be maintained between problem-solving and laying a foundation of factual and theoretical knowledge. Some practical problems in the implementation of these recommendations are considered.

g 48 Lewis, L. J.
Science teaching in the tropical dependencies.
Oversea Ed., v. 24, no. 1, Apr. 1952: 10-15.
LC, LIE

A reappraisal of the reasons for science teaching in the tropical dependencies with suggested lines for the organisation of science teaching.

g 49 Lockard, J. David, ed.
Report of the International Clearinghouse on Science and Mathematics Curricular Developments. 1967.
Science Teaching Center, University of Maryland, 1967. 413 p.

An annual publication containing detailed information on many of the science and mathematics curriculum projects in Africa.

g 50 Martin, W. T. and James L. Aldrich
The African Education Program - activities in mathematics and science.
E.S.I. Quarterly Report, summer/fall 1965: 107-112.
MCM, MWC

A report on the effort of the African Education Program to bring to Africa some of the newer and more effective methods of preparing improved school curricula in mathematics and the sciences as developed on the basis of American experience in the past decade. The mathematics program is concerned with developing instructional materials, testing these materials experimentally, training teachers to use the materials for experimental testing, and preparing personnel for teacher training institutions.

g 51 Morgan, G. S.
Some impressions of science education in Polish schools.
Jour. of the A.S.E.C.A., v. 4, 1963: 17-75.

g 52 The most urgent needs in African science: education and research.
Jour. of Human Relations, v. 10, winter/spring 1962: 310-311.
CLU, GU, ICU, IEN,
LC, LCR, NN, OU

g 53 Mumford, W. Bryant
Some notes on the teaching of biology in African dependencies.
Biology, v. 1, no. 1, spring 1935: 12-15.
LIE

Biology, as a subject to be taught, is a necessity in Africa; a rigid syllabus should not be laid down and logical orders should not be adhered to but rather 'psychological orders' should be followed.

g 54 Nichols, B.
New trends in improving science education for the elementary grades.
In A Report of an African Education Program.
Educational Services Inc., Watertown, Mass., 1965.

Nuffield Foundation Science Teaching Project

See: These books ... (cs 31);
Chadwick, B. T. (ws 27);
Examples of Nuffield-type ... (cs 74);
Howson, A. G. (ws 155);
James, W. S. (cs 108);
Kenya Science Teachers' Association (es 110);
McIntyre, Elizabeth (cs 128);
Merritt, R. (cs 152);
Morgan, David R. (es 150);
Nuffield Foundation ... (cs 173);
Nuffield science ... (cs 174);
Report of the curriculum development conference ... (es 190);
Woolman, M. K. (es 292, es 293).

g 55 Okosi
The Entebbe Mathematics workshop, summer 1964.
In A Report of an African Education Program.
Educational Services Inc., Watertown, Mass., 1965.

g 56 Olaniyan, C. I. O.
The place of science associations in the development of national scientific communities in Africa.
Document: Second Category: introductory documents to serve as guides to discussion (20), Lagos Conference, 28 July to 6 Aug. 1964.

See Unesco. Conferences and Meetings. Lagos Conference (1964) and Associated Documents.

g 57 Onabamiro, S. D.
Concepts basic to a study of science - the economics of biology.
In School Science Teaching. Report of the Commonwealth Conference on the Teaching of Science in Schools, University of Ceylon, Peradeniya, Ceylon, 9 Dec. to 21 Dec. 1963. Commonwealth Education Liaison Committee, London, 1964: 42-51.

See Commonwealth Conference on the Teaching of Science in Schools. 1963. (g 10)

History; faults in the teaching of science in African countries; requisites for the school science course.

g 58 Osborne, Denis G.
University physics in Africa.
Int. Rev. of Ed., v. 10, no. 3, 1964: 274-283.
CLU, LC, NN, NSU, OCU

A brief look at the structure and problems of African university physics departments.

g 59 Osiyale, Akindele O.
Primary school science in Africa. An experiment in education.
E.S.I. Quarterly Report, spring/summer 1966: 74-76.

What broad generalizations can be made about science education in most (English-speaking) African countries?; what is the E.S.I. African Elementary Science Program about?; the situation today; how is the African Elementary Science Program working?

g 60 Otieno. W. C.
Current problems in the education of an African scientist - and the role such a scientist could play in the economic and social development of Africa.
Document 33 from the First International Conference of Africanists, 11 - 18 Dec. 1962. 10 p.
LIE

g 61 Oyelese, John O.
The Entebbe Mathematics workshop, summer 1963.
In A Report of an African Education Program.
Educational Services Inc., Watertown, Mass., 1965.

g 62 ----- -----
The second Entebbe Mathematics workshop, summer 1963.
Educational Services Inc., Quarterly Report, winter/spring 1964: 93-101.
MCM, MWC

Report and background of the workshop.

g 63 Paulian, R.
The improvement of the teaching of the natural sciences in secondary and higher education, considered as a means of promoting, later on, research on natural resources and their utilization.
Document: Second Category: introductory documents to serve as guides to discussion (15), Lagos Conference, 28 July to 6 Aug. 1964.

See Unesco. Conferences and Meetings. Lagos Conference (1964) and Associated Documents.

g 64 Pullen, M.
The use of improvised apparatus for the teaching of science in the lower forms of secondary schools in Africa.
In The Teaching of Science and Mathematics.
Unesco Regional Centre for Educational Information and Research in Africa, Accra, Occasional Paper No. 3, 1965: 72-74.

See also Unesco (g 83).

Rabat Conference - 1962

See Unesco. Conferences and Meetings. Rabat Conference (1962) and Associated Documents.

g 65 Rising number of African scientists.
School and Society, v. 92, 14 Nov. 1964: 328.
NSU

A short review of the proposed Lagos Conference plus a few additional comments.

g 66 Raum, Otto F.
The African's gift for mathematics.
Oversea Ed., v. 6, no. 4, 1935: 166-171.
LC, LIE

g 67 Religion and science. An African setting.
Times Ed. Supp., 1474, 10 July 1943: 364.

Magic as a serious adversary of both science and religion in Africa; its widespread effects in delaying progress.

g 68 Ritchie, J. F.
Science in the African school?
Oversea Ed., v. 15, no. 3, Apr. 1944: 100-104.
LC, LIE

g 69 Rugumayo, Edward B.
Science in primary schools in Africa, 1 & 2.
Sci. Teach., Dec. 1963: 51-52; Feb. 1964: 78-79.
OVA

Comprises one part of one chapter in an entry entitled 'Modern Scientific Ideas and the Solution of Africa's Problems' which won a second award in the 1962 Guinness Awards for science teachers in training.

Science in General Education Conference

See S.I.G.E. Conference (g 71).

g 70 Science on the equator.
Times Ed. Supp., 2334, 12 Feb. 1960: 273.

Pleasures and problems of teaching science to pupils from a non-scientific environment; interesting, and sometimes frustrating, results of using standard equipment (and textbooks) in a tropical climate and at high altitude.

g 71 S.I.G.E. Conference
Science in General Education Conference. July 1 - 8, 1962.
Handbook.
Institute of Education, University of Basutoland, Botswana, and Swaziland, Roma, Basutoland, 1962. 76 p.
LIE, MIE, RCA

A series of seminar reports on various aspects of science teaching and programming at the different levels of education, and on the training of science teachers in Africa. A number of resolutions and recommendations accompany the reports.

g 72 Solaru, T. T.
The Endicott House Conference on African Education.
In A Report of an African Education Program.
Educational Services Inc, Watertown, Mass., 1965.

Tananarive Conference - 1962

See Unesco. Conferences and Meetings. Tananarive Conference (July 1962) and Associated Documents. - or -
Unesco. Conferences and Meetings. Tananarive Conference (Sept. 1962) and Associated Documents.

g 73 Ukeje, B. Onyerisara
The Entebbe Mathematics workshop, summer 1962.
In A Report of an African Education Program.
Educational Services Inc., Watertown, Mass., 1965.

United Nations Educational, Scientific and Cultural Organisation.

See Unesco.

UNESCO

Conferences and Meetings

Abidjan Conference (1960) and Associated Documents

(Meeting of Experts on the Teaching of Science in Tropical Africa. Abidjan, Ivory Coast, 5 - 18 Dec. 1960.)

g 74 Unesco
Final report of the meeting of experts on the teaching of science in Tropical Africa, Abidjan, Ivory Coast, 5 - 18 Dec. 1960.
Unesco (Unesco/NS/169), Paris, 1961. 13 p.

See also Cessac, J. (g 4).

Addis Ababa Conference (1961) and Associated Documents

(Conference of African States on the Development of Education in Africa. Addis Ababa, Ethiopia, 15 - 25 May 1961.)

g 75 Unesco
Final report - conference of African states on the development of education in Africa, Addis Ababa, 15 - 25 May 1961.
Unesco (Unesco/ED/181), Paris, 1961. 225 p.

The 'Addis Ababa' Report, including the Outline of a Plan for African Educational Development (g 77), is a continent wide attempt at setting educational goals and priorities over a five year (1961-1965) and a twenty year 1961-1980) period.

g 76 ----- -----
Final report of the meeting of ministers of education of African countries participating in the implementation of the Addis Ababa Plan.
Unesco (Unesco/ED/191), Paris, 1963. 223 p.

First meeting, held in Paris in 1962, as a follow-up of the Addis Ababa Conference. Re-examines national educational plans in relation to Addis Ababa goals and to economic development and financial possibilities in each country.

g 77 ----- -----
Outline of a plan for African educational development - conference of African states on the development of education in Africa, Addis Ababa, 15 - 25 May 1961.
Unesco (Unesco/ED/180), Paris, 1961.

Lagos Conference (1964) and Associated Documents
(International Conference on the Organization of Research and Training in Africa in Relation to the Study, Conservation and Utilization of Natural Resources. Lagos, Nigeria, 28 July to 6 August 1964.)

g 78 Unesco
Final report of the Lagos conference.
Unesco (N.S.64/D.36/A), Paris, 1964. 102 p.

The report of a conference held in Lagos in 1964 to promote studies, research and training in the earth sciences. The conference dealt with such topics as the formulation of national science policies, the organization of research, the development of a scientific "community" in African educational systems, the improvement of science teaching, and measures to create a "science-conscious" public.

g 79 ----- -----
Lagos Conference. Selected documents.
Unesco (N.S.64/D.38/A), Paris, 1965. 214 p.

Contains reports by experts on ways of overcoming the present shortage of personnel and means of financing research. Includes estimates of the expenditure required for research in the next fifteen years as well as the part to be played by international cooperation.

g 80 ----- -----
Outline of a plan for scientific research and training in Africa.
Unesco (N.S.64/D.35/A), Paris, 1964. 25 p.

g 81 ----- -----
Scientific research in Africa: national policies, research institutions.
Unesco (N.S.65/D.39/A), Paris, 1966. 214 p.

g 82 ----- -----
Study of general types of organizations responsible for the determination of science policy at the national level in the African countries.
Document: Working papers prepared by the secretariat, (4c), Lagos Conference, 28 July to 6 Aug. 1964.

Lagos Conference (1964) and Associated Documents

See also: Olaniyan, C. I. O. (g 56);
Paulian, R. (g 63).

Meeting of Science and Mathematics Teachers of Special Fund Colleges, Abidjan, Ivory Coast, 2 - 11 July 1964

g 83 Unesco
The teaching of science and mathematics. Papers presented at the meeting of science and mathematics teachers of special fund colleges, Abidjan, 2 - 11 July 1964.
Unesco Regional Centre for Educational Information and Research in Africa, Accra, Occasional Paper No. 3, 1965.
84 p.
In French and English.
MIE

A collection of nineteen papers presented at the meeting of science and mathematics teachers of advanced teacher training colleges in Africa. The papers cover such topics as: the teaching of the sciences and of mathematics; the training of teachers of these subjects; the use of school television; notes on a preliminary course in technology; the organisation of natural science laboratories.

Meeting of Science and Mathematics Teachers of Special Fund Colleges ...

See also:[2] Haggis, Sheila M. (g 39);
Pullen, M (g 64);
Unesco, The Secretariat (g 92);
Zuberi, H. A. (g 99).

Rabat Conference (1962) and Associated Documents

(Seminar on Basic Science Teaching in African Universities. Rabat, Morocco, Dec. 1962.)

g 84 Unesco
Regional seminar on basic science teaching in African universities, Rabat, Morocco, 1962.
Unesco (Unesco/NS/DS), n.d. mimeo.
MAK, RCA, UCD

g 85 ----- -----
The teaching of science in African universities.
Unesco (ED(NS).63/XVII.3/A), 1964. 112 p. tables.

The general report and recommendations deal with the Africanization of curricula, inter-disciplinary relationships and new disciplines, the relationship between secondary and higher education, and the preparation of secondary school teachers and curricula.

[2] Note: Only those articles which are given in English are included in this document.

Tananarive Conference (July 1962) and Associated Documents
(Meeting of Experts on the Adaptation of the General Secondary School Curriculum in Africa. Tananarive, Madagascar, 2 - 13 July 1962.)

g 86 Unesco
Final report of the meeting of experts on the adaptation of the general secondary school curriculum in Africa, Tananarive, 2 - 13 July 1962.
Unesco (Unesco/ED/196), Paris, 31 Oct. 1962. 59 p.

Tananarive Conference (July 1962) and Associated Documents

See also Haggis, Sheila M. (g 37).

Tananarive Conference (Sept. 1962) and Associated Documents
(Conference on the Development of Higher Education in Africa. Tananarive, Madagascar, 3 - 12 Sept. 1962.)

g 87 Unesco
The development of higher education in Africa. Conclusions and recommendations of the conference on the development of higher education in Africa, Tananarive, 3 - 12 Sept. 1962.
Unesco (ED.62/D.20/A), Paris, 1963. 32 p.

g 88 ----- -----
The development of higher education in Africa. Report of the conference on the development of higher education in Africa, Tananarive, 3 - 12 Sept. 1962.
Unesco (ED.62/D.20/A), Paris, 1963. 339 p.

Working Party on the Secondary School Curriculum in Africa

g 89 Unesco
First working party on the secondary school curriculum in Africa.
Africa Ed. (Accra), v. 3, no. 1, 1966: 4-9.
RCA

See particularly recommendations of the 1964 report - science, pages 5-7 (training of teachers, handbook on science curriculum revision; science textbooks; examinations; buildings and equipment; laboratory assistants).

g 90 ----- -----
Second working party on the secondary school curriculum in Africa.
Africa Ed. (Accra), v. 3, no. 1, 1966: 10-11.
RCA

A brief report.

Projects

Pilot Project on New Approaches and Techniques in Biology Teaching in Africa

g 91 Unesco
Proposed pilot project on new approaches and techniques in biology teaching in Africa.
Africa Ed. (Accra), v. 3, no. 1, 1966: 11-17.
RCA

A comprehensive description, including time tables for various phases of the project.

Pilot Project on New Approaches and Techniques in Biology Teaching in Africa

See also: Mwanza, N. Peter (cs 165, cs 166);
Ninan, V. (ws 216);
Report on the Curriculum Development Conference ... (es 190);
Unesco biology pilot project (es 242);
Uganda Science Teachers' Association. News and Notes. (es 258).

Publications and General Articles

g 92 Unesco, The Secretariat
Teaching of science and mathematics in middle schools.
In The Teaching of Science and Mathematics.
Unesco Regional Centre for Educational Information and Research in Africa, Accra, Occasional Paper No. 3, 1965: 1-6.
In French and English.

See also Unesco (g 83).

g 93 Unesco and International Bureau of Education
Teaching of mathematics in secondary schools. XIXth International Conference on Public Education. Convened by Unesco and I.B.E. [International Bureau of Education].
Unesco and I.B.E. Publication No. 172, Geneva, 1956. 249 p.

See also Liberia, Department of Public Instruction (wm 18).

g 94 White, Stephen
African Education Program.
E.S.I. Quarterly Report, summer/fall 1964: 109-116.
MCM, MWC

History of the program with a report on activities.

g 95 Winterbottom, J. M.
Nature study and general science in Africa.
Oversea Ed., v. 12, Oct. 1940: 5-8.
COL, LC, LIE

g 96 Wrong, M. and D. G. Brackett
Notes on nature study and agriculture textbooks used in Africa.
Africa, v. 5, no. 4, 1932: 474.
NSU

g 97 Yates, E. Leighton
The function of the physical sciences in a developing country.
In Science and Medicine in Central Africa. Proceedings of the Central African Scientific and Medical Congress. Lusaka, Northern Rhodesia. 26 - 30 August 1963. Snowball, G. J., ed.
Pergamon Press, London, 1965: 31-35.

g 98 Zacharias, Jerrold R.
Scientific and engineering education in newly developing countries.
In A Report of an African Education Program.
Educational Services Inc., Watertown, Mass., 1965.

g 99 Zuberi, H. A.
The organization of natural science laboratories.
In The Teaching of Science and Mathematics.
Unesco Regional Centre for Educational Information and Research in Africa, Accra, Occasional Paper No. 3, 1965: 82-84.
In English with French summary.

See also Unesco (g 83).

EASTERN AFRICA
(SCIENCE)

es 1 Abdulrahman, A. M
The introduction of qualitative analysis to form V.
S.T.A.R.T. Jour., Nov. 1965: 15-17.

Statistics on the pass/fail rate for Zanzibar pupils (1960-64) taking H.S.C. in chemistry and a brief outline of the way in which they were taught qualitative analysis. No correlation is indicated by the results.

es 2 ----- -----
Test-tube experiments for the study of ammonia in a school laboratory.
S.T.A.R.T. Jour., Dec. 1966: 17.

Collection; solubility; reducing action.

es 3 About books
K.S.T.A. Bull., [1962].

es 4 Aeroplanes, Dodos, and Mr. Bernoulli.
K.S.T.A. Bull., [1962].

es 5 Afrigas
E.A.S.T.A. Jour., v. 1, no. 1, Sept. 1959: 25-26.

Statistics and information on the advantages and disadvantages of this type of gas.

es 6 Anderson, H.
Book list.
In Modern Science Teaching, S.T.A.R.T. Jour. Supplement, Feb. 1967: 17-19.

See also Webb, N. G. G. (es 283).

Selected references on the texts and materials in modern science teaching programs.

es 7 Banage, W. B.
Some thoughts on science education in Uganda schools.
Makerere J., v. 10, Nov. 1964: 53-60.
GU, KU, LIE,
NCL, NN

Need to turn to new methods of science teaching is outlined; finance, textbooks and syllabi, and teacher supply, are main problems in implementing the change-over.

es 8 Banage, W. B.
The teaching of science in Uganda secondary schools.
Paper (C.T.S.(c)(4)(c)(2)) read at the plenary session of the Commonwealth Conference on the Teaching of Science in Schools, University of Ceylon, Peradeniya, Ceylon, 9 Dec. to 21 Dec. 1963.

See also Commonwealth Conference on the Teaching of Science in Schools. 1963. (g 10).

Review of science education in Uganda with special reference to staffing problems, history and teaching methods.

es 9 Baraclough, G. W.
Chemistry notes.
Sci. Teach. Jour. (Uganda), July 1966: 32.

The electrochemical series; rocket fuel.

es 10 Benjamin, T. D. and M. K. Woolman
Physical science handbook. First year.
Nairobi Science Teaching Centre, Jan. 1964. 52 p.

es 11 ----- -----
Scheme of work for first year physics and chemistry.
Curriculum Development Centre (Science Section), Nairobi, Aug. 1966. 23 p. Revised edition.

es 12 Billinghurst, J. R.
Consciousness.
Sci. Teach. Jour. (Uganda), July 1967: 17-28.

A lecture on the meaning of consciousness.

es 13 Bird, Anita and Yvonne Woodard
Science teaching in girls' schools.
S.T.A.R.T. Jour., Dec. 1966: 11.

Growing importance of science subjects; difficulties encountered and the importance of biology and health science.

es 14 Birnie, A. E.
Biology in everyday life.
S.T.A.R.T. Jour., July 1966: 18-19.

Letter to the editor.

es 15 Bishop, G. D. and Y. A. Pentin
New horizons in science education.
In Modern Science Teaching, S.T.A.R.T. Jour. Supplement, Feb. 1967: 2.

See also Webb, N. G. G. (es 283).

Short review of past and present thinking in science education.

es 16 Bowles, J. M.
Annual conference.
Sci. Teach. Jour. (Uganda), Dec. 1965: 2-3.

Brief report on the conference activities.

es 17 ----- -----
Training Ugandan science teachers.
Sci. Teach. Jour. (Uganda), Dec. 1966: 26-33.

Description of the National Teachers' College at Kyambogo; problems in teacher training; role of the school.

es 18 Boxch, Dale
Graphing in science.
S.T.A.R.T. Jour., July 1966: 16-17.

es 19 Briggs, J. G. and R. B. Ingle
School chemistry filmstrips for East Africa. 1. Fermentation and distillation: the manufacture of 'Uganda Waragi'.
Faculty of Education, Makerere University College, Aug. 1967. 25 p. photographs.

Handbook and teachers' guide for use with the filmstrip. Contains contact prints of the filmstrip sequence.

es 20 Buy in Kenya.
Kenya Sci. Teach. Bull., v. 3, no. 4, Sept. 1964: 20-21.

Science laboratory apparatus manufactured in the Kimiti Prison Industry, to specifications furnished by the Nairobi Science Teaching Centre, is to be furnished to selected schools.

es 21 Buyer's guide for science teachers.
Sci. Teach. Jour. (E.A./Uganda), v. 1, no. 6, Nov. 1963: 30-37.

Where (in Nairobi) to buy many useful items for school science.

es 22 Careers in research and industry.
Uganda School Science Review, v. 2, no. 1, Mar. 1953: 2-5.

General picture of the early training and prospects of a man entering the electricity supply industry, currently in its infancy in Uganda.

es 23 Cavanaugh, J. R.
Experimenting with gibberellic acid.
Sci. Teach. Jour. (Uganda), Dec. 1966: 24-26.

Areas in which research has been done and needs to be done; the use of gibberellic acid in secondary school biology classes.

es 24 ----- -----
Selected experiments with gibberellic acid.
Uganda Science Teachers' Association, n.d. 9 p.

An information booklet.

es 25 Chaplin, Basil G. H.
The revision of science curricula for East Africa.
Sci. Teach. Jour. (Uganda), July 1966: 10-12.

General characteristics of the new approaches in science and problems arising out of the selection, adaptation and amendment of the new science courses.

es 26 Clements, Seamus
High school astronomy in Kenya.
Kenya Scí. Teach. Bull., May 1965: 12, 17.

es 27 Coe, M. J.
K.S.T.A. conference. Biology discussion group. Aspects of teaching practical biology in East Africa.
Sci. Teach. Jour. (E.A./Uganda), v. 1, no. 6, Nov. 1963: 31-37.

Drawing; field work; specimens; syllabi.

es 28 Collier, Keith E.
The death of equivalents?
S.T.A.R.T. Jour., Mar. 1966: 20-22.

The trend in modern syllabi seems to make the use of equivalent weights unnecessary. Some examples (finding formulae, second law of electrolysis, titrations) are included to show how topics which formerly needed equivalents may be taught using atomic weights, etc.

es 29 Collier, Keith E.
A modern approach to chemistry.
S.T.A.R.T. Jour., v. 2, no. 3, Aug. 1964: 18-20.

es 30 ----- -----
Practical examination for School Certificate chemistry.
S.T.A.R.T. Jour., v. 2, no. 3, Aug. 1964: 16.

es 31 ----- -----
A revised chemistry syllabus for school certificate?
S.T.A.R.T. Jour., v. 2, no. 1, Jan. 1964: 11-13.

es 32 ----- -----
Some notes on S.T.C. [Science Teaching Centre] Nairobi.
S.T.A.R.T. Jour., v. 1, no. 1, Sept. 1963: 5-6.

es 33 Courses at the Dar es Salaam Technical College.
S.T.A.R.T. Jour., v. 1, no. 1, Sept. 1963: 9-10.

es 34 Crawford, Malcolm
Thoughts on chemical research and teaching in East Africa.
Minerva, v. 4, no. 2, (winter) 1966: 170-185.
CLU, IEN, LC,
LIE, NN

es 35 Crawley, D. E. L.
On building a laboratory.
E.A.S.T.A. Jour., v. 1, no. 3, Apr. 1960: 21-24

Factors to be considered when selecting a design and fitments. Main points of the three laboratories (chemistry, biology, and physics) which were built at King's College, Budo, Uganda. Plans are given.

es 36 Creaser, H.
Editorial
E.A.S.T.A. Jour., v. 1, no. 3, Apr. 1960: 2-3.

On apparatus supply.

es 37 ----- -----
Notes from letters.
E.A.S.T.A. Jour., v. 1, no. 3, Apr. 1960: 25.

Requests for information on various topics.

CURRICULUM DEVELOPMENT CENTRE (SCIENCE SECTION), NAIROBI

Formerly known as The Nairobi Science Teaching Centre.

es 38 Curriculum Development Centre (Science Section)
Apparatus list for first and second year science.
Curriculum Development Centre (Science Section), Nairobi,
May 1967. 10 p.

es 39 Curriculum Development Centre (Science Section)
Apparatus list for third and fourth year science.
Curriculum Development Centre (Science Section), Nairobi, n.d. 6 p.

es 40 Nairobi Science Teaching Centre
Nairobi Science Teaching Centre.
S.T.A.R.T. Jour., 1965(y): 11-13.

An article in the form of a fairly comprehensive letter to the editor on the activities of the N.S.T.C.

es 41 ----- -----
Nairobi Science Teaching Centre, course C - biology section.
Nairobi Science Teaching Centre, 1963. 4 p. mimeo.

Curriculum Development Centre (Science Section), Nairobi

See also: Benjamin, T. D. and M. K. Woolman (es 10, es 11);
Buy in Kenya (es 20);
Collyer, Keith E. (es 32);
Gautam, S. C. (es 68);
Kenya, Ministry of Education (es 99);
Muraguri, Nicholas and M. K. Woolman (es 160, es 161);
Norman, G. C. (es 164, es 167 - es 171);
Report on the ... (es 190);
Scholes, Roger (es 201);
Warburton, Robert (es 274 - es 277).

es 42 Davis, Peter M. H.
Home-made apparatus.
Sci. Teach. Jour. (Uganda), June 1965: 4-6.

Design, construction and use of home-made apparatus. Notes on making rulers, balances, measuring cylinders, wash bottles, mounted mirrors, and electrical apparatus.

es 43 ----- -----
A new approach to primary science.
Sci. Teach. Jour. (Uganda), July 1966: 13-15.

Problems and criteria involved in the development of primary school science work. Simple practical work by the students is advocated.

es 44 Davis, Peter M. H. and R. G. Thomas
Making up solutions.
S.T.A.R.T. Jour., July 1966: 15.

g 45 de Bunsen, Bernard
Encouraging words from Makerere College.
Uganda School Science Review, v. 2, no. 1, Mar. 1953: 1.

President of the Uganda Education Association writes (briefly) on some of the contributions which science teachers can make in developing science education in Uganda.

es 46 Desai, Doltray Naranji
A comparative study of the teaching of science (with some reference to chemistry) in grammar schools in England and senior secondary schools in Uganda.
Associateship Report, Institute of Education, University of London, July 1963. 239 p. biblio., appendices.
LIE

es 47 Dhindsa, Bahal Singh
The teaching of science in grammar and public schools in the U.K. and its applications to Asian schools in Uganda.
Associateship Report, Institute of Education, University of London, July 1955. 287 p. tables, diagrs., appendices.
LIE

es 48 Dierauf, Edward
A demonstration of the kinetic theory of gases.
S.T.A.R.T. Jour., Nov. 1965: 7-11.

An apparatus to demonstrate the gas laws, using 'puffed wheat' as molecules.

es 49 Dipple, D. W.
Uganda Cement Industry.
Sci. Teach. Jour. (Uganda), Dec. 1966: 19-23.

Brief history; description of manufacture; chemical reactions involved; properties of concrete.

es 50 Down, B. C.
The Ministry of Agriculture Training Institute, Tengeru.
S.T.A.R.T. Jour., July 1966: 10-11.

es 51 Dunphy, J. M.
The Higher Certificate practical chemistry course.
S.T.A.R.T. Jour., July 1966: 12-13.

East African Science Teachers' Association

See Uganda Science Teachers' Association.

E.A.S.T.A.

See Uganda Science Teachers' Association.

es 52 Editorial.
Uganda School Science Review, v. 2, no. 1, Mar. 1953: no pagination.

On the value of laboratory work in bringing science to life for the student.

es 53 Eeles, G. C.
Biology notes.
Sci. Teach. Jour. (Uganda), July 1966: 30-32.

Breeding small mammals; amphibia for H.S.C.; The East African Natural History Society; microscope lamps.

es 54 Elwick, J. S.
K.S.T.A. notes. August 1959.
E.A.S.T.A. Jour., v. 1, no. 1, Sept. 1959: 2.

On the expansion of K.S.T.A. to cover all three territories.

es 55 Emeleus, T. G.
The earth's magnetic field.
S.T.A.R.T. Jour., June 1967: 14-15.

es 56 The English educational system.
S.T.A.R.T. Jour., v. 2, no. 2, Apr. 1964: 21-22.

es 57 Ezechiel, S. B.
A biology experiment conducted by a teacher on course 17 at the Nairobi Teaching Centre. Can seeds grow without taking in oxygen?
K.S.T.A. Bull., v. 2, no. 3, Nov. 1963: 10-11.

A teaching outline for an experiment in plant respiration.

es 58 Film library.
S.T.A.R.T. Jour., 1965(y): 9-10.

On the use of the film library at the Ministry of Education, Dar es Salaam. A list of current holdings of science films is included.

es 59 Flemming, P. G.
The problem of revision.
S.T.A.R.T. Jour., Nov. 1965: 3-6.

A scheme for helping pupils to revise their work for examinations.

es 60 ----- -----
Teaching the scientific method.
S.T.A.R.T. Jour., Dec. 1966: 12-13.

The methods of scientific investigation are important in gaining a proper understanding of the place and function of science in a rapidly changing world. A student learns science by being placed in problem-solving situations. Examples are given.

es 61 Fraser, Agnes
Science and health in East Africa.
Oversea Ed., v. 1, no. 4, 1929/1930: 136-143.
LC, LIE

es 62 French, A. K.
Micro-projection with the Aldis filmstrip projector.
E.A.S.T.A. Jour., v. 1, no. 2, Dec. 1959: 25-28.

Instructions, with diagrams.

es 63 ----- -----
Termites.
Sci. Teach. Jour. (Uganda), July 1966: 23-25.

Vernacular vocabulary and references on termites in East Africa.

es 64 From laboratory and field to classroom.
S.T.A.R.T. Jour., v. 2, no. 2, Apr. 1964: 4-5.

es 65 The future scientists of Kenya.
Kenya Sci. Teach. Bull., v. 4, no. 3, May 1966: 12-14.

A federation of science clubs to stimulate pupils' interest in science. F.S.K. will provide literature for science clubs and publicity for their projects. Photographs of some school projects are included.

es 66 Gappert, Gary
An American on science in East Africa.
Transition, v. 2, no. 5, July/Aug. 1962: 28-30.

A critical essay on science education in East Africa in which the author mirrors common American reactions to African education. The author criticizes the examination system for placing exclusive premium on retaining facts rather than a creative mind, a curriculum which produces arts graduates who lack any understanding of science, and science programs which turn out scientific purists disinterested in the practical applications of science in society.

es 67 Gately, I. M.
Fun with flames.
Sci. Teach. Jour. (Uganda), June 1965: 7-8.

Experiments on the study of flames: the Bunsen flame is hollow; products of combustion; ignition temperature; oxidation/reduction; flame mantles; 'reversed flames'.

es 68 Gautam, S. C.
Nairobi Science Teaching Centre schemes.
S.T.A.R.T. Jour. (A.G.M. Supplement), Dec. 1964: 11.

Summary of answers to a questionnaire on the schemes of work designed by the Nairobi Science Teaching Centre.

es 69 Geary, Robert
Self rebuilding robots.
Kenya Sci. Teach. Bull., May 1965: 9.

On crystal growing.

es 70 Godfredsen, E. A.
Teaching science in primary school.
Tanzania Ed. J., 1967: 23-25.

This article is intended as the first of a series devoted to the teaching of science in primary schools in Tanzania. The history of science, the purpose and goal of science teaching, and the example of time keeping as a simple classroom activity are considered.

es 71 Gravity.
K.S.T.A. Bull., 1962.

es 72 A guide to East Africa's common Acacias.
Sci. Teach. Jour. (E.A.), v. 1, no. 5, Aug. 1961: 32.

Reprint of a paper which appeared in the Jour. of the E.A. Natural History Soc., v. 13, no. 5, page 102.

es 73 Hall, J. R.
Ecology teaching in schools.
Sci. Teach. Jour. (Uganda), June 1965: 15-21.

Reasons (for teaching ecology); guiding principles; problems; possible types of work; important concepts; suggested teaching scheme; useful books.

es 74 ----- -----
The editor.
Sci. Teach. Jour. (E.A./Uganda), v. 1, no. 6, Nov. 1963: 41.

A statement that one member (Mr. Hall) is willing to act as coordinator in the attempt to disseminate information on local flora and fauna to those who are in need of this information. Information from other members is solicited.

es 75 ----- -----
Editorial.
Sci. Teach. Jour. (E.A./Uganda), v. 1, no. 6, Nov. 1963: ii.

Requesting readers' views on the future publication of the journal.

es 76 Hall, J. R.
A key to the more common invertebrates of grassland.
Kenya Sci. Teach. Bull., v. 4, no. 3, May 1966: 15-17.

es 77 Hancock, G. L. R. and A. E. N. Lule
The teaching of elementary ecology.
Uganda Teach. J., v. 1, 1939: 277-283.
LIE

es 78 Hess, Ernest M.
Cleaning of bones for demonstration and mounting.
S.T.A.R.T. Jour., June 1967: 5.

es 79 ----- -----
Experiment with exhaled air.
S.T.A.R.T. Jour., June 1967: 6.

es 80 ----- -----
Preservation of birds by the injection of formaldehyde.
S.T.A.R.T. Jour., Dec. 1966: 15

Brief procedural details.

es 81 H. E. W.
Thinking aloud. Are we satisfied with our K.S.T.A.?
Sci. Teach. Jour. (E.A.), v. 1, no. 5, Aug. 1961: 34-36.

Past work and possible future activities of the Association. A change of attitude is needed.

es 82 Hilton, M. J.
A conference for chemistry teachers in the Kilimanjaro/ Arusha regions.
S.T.A.R.T. Jour., July 1966: 7.

es 83 ----- -----
The formation and activities of the Kilimanjaro and Arusha regional branch.
S.T.A.R.T. Jour., Mar. 1966: 24.

es 84 ----- -----
Syllabus revision in chemistry.
S.T.A.R.T. Jour., Mar. 1966: 13-15.

Refers to the Nuffield Chemistry Program and other current chemistry programs.

es 85 Hogg, David A.
Kenya Student Science Congress.
K.S.T.A. Bull., 1964: 4, 10.

es 86 Hogg, David A.
Molecular models for organic chemistry.
K.S.T.A. Bull. (Conference Issue), Jan. 1964: 3-5.

Details are given on the construction of inexpensive stereo-chemical models.

es 86 Holway, J. D.
Looking at the stars.
E.A.S.T.A. Jour., v. 1, no. 3, Apr. 1960: 18-20.

Astronomy as a practical, cheap hobby for schoolboys. Advice on how to start and operate an 'astronomy club'.

es 88 ----- -----
The teaching of Boyle's Law.
Sci. Teach. Jour. (E.A.), v. 1, no. 4, 1960: 3-12.

An account of how not to teach this topic, followed by suggestions for more effective teaching.

es 89 How to prepare a Science Congress talk.
K.S.T.A. Bull., [1962].

es 90 Hunter, A. N.
K.S.T.A. presidential address.
Sci. Teach. Jour. (E.A./Uganda), v. 1, no. 6, Nov. 1963: 1-14.

The role of the scientist in society: What type of person should we be 'turning out'? How do these considerations influence our teaching and planning?

es 91 Huxley, Julian Sorell
A biological approach to education in East Africa.
Oversea Ed., v. 2, no. 1, Oct. 1930: 1-30.
LC, LIE

es 92 ----- -----
Biology and its place in native education in East Africa.
African (East), No. 1134, Apr. 1930. 45 p.
COL, LIE

A Colonial Office survey, with recommendations, on biology and its place in the educational curricula of East Africa. Strongly advocates that science, especially biology and geography, should form the core of the school curriculum in East Africa and that, because of their application to human problems, these subjects should be taught with a strongly applied and practical bias. Also emphasized that it was "most important to teach nature study and science so as to stimulate the powers of observation and ... curiosity and not a mere body of facts and rules".

es 93 The hydraulic ram pump.
S.T.A.R.T. Jour., v. 2, no. 3, Aug. 1964: 8-9.

es 94 Ibukun, Olu
Science education for girls.
Kenya Sci. Teach. Assoc. [Bull.], Mar. 1967: 38-40.

Reviews the work of Unesco.

es 95 An iron resistance thermometer.
Sci. Teach. Jour. (E.A.), v. 1, no. 4, 1960: 22.

Diagram of, and instructions for making, a simple iron resistance thermometer.

es 96 Irungu, David
Primary school science.
Kenya Sci. Teach. Bull., v. 3, no. 4, Sept. 1964: 4-6.

History in Kenya; current aims and problems.

es 97 Kamulegeya, Joseph
Science notes and improvisations. A class demonstration electric motor made by students of St. Mary's College, Kisubi, Entebbe.
Uganda School Science Review, v. 2, no. 1, Mar. 1953: 26-29, 30.

Notes and diagrams on the construction of a simple electric motor, using 'odds and ends'.

es 98 Kendall, W. J.
Simple experiments in chromatography.
Sci. Teach. Jour. (Uganda), June 1965: 2-3.

General methodology and details of experiments which can be performed with ink, indicator mixtures, natural pigments, fruit juice, and metal ions.

es 99 Kenya, Ministry of Education
Curriculum Development Centre.
n.p., n.d. 8 p. map.

Description of the Curriculum Development Centre in Nairobi.

es 100 Kenya, Ministry of Education
Inservice training courses (in Kenya).
Paper (C.T.S.(c)6(b)(2)) read at the plenary session of the Commonwealth Conference on the Teaching of Science in Schools, Univ. of Ceylon, Peradeniya, Ceylon, 9 Dec. to 21 Dec. 1963.

See also Commonwealth Conference on the Teaching of Science in Schools. 1963. (g 10).

Review of the work of the Nairobi Science Centre. The paper is broken into three parts: I. The organisation and operation of the science workshop (A.G. Belson); II. The biology program (Z. Subarsky); III. The physical sciences program (T.D. Benjamin).

es 101 ----- -----
Primary school syllabus.
Ministry of Education, Nairobi, 1967. 183 p.

See particularly: Mathematics, 58-71; New Primary Mathematics, 72; General Science, 111-144.

es 102 Kenya, Ministry of Education and U.S.I.S.
Education profile.
Kenya Sci. Teach. Bull., May 1965: 12-13.

A comparison of the U.S., British, and Kenyan educational systems and terminology.

KENYA SCIENCE TEACHERS' ASSOCIATION

Also known as K.S.T.A.

Conferences and Meetings

es 103 Kenya Science Teachers' Association
K.S.T.A. annual conference, Jan. 1964 - discussion of physics and chemistry in forms 1 and 2.
K.S.T.A. Bull., 1964: 5, 12.

es 104 ----- -----
K.S.T.A. conference discussion - science for the Higher School Certificate general paper exam.
K.S.T.A. Bull., 1964: 7.

es 105 ----- -----
K.S.T.A. Convention - January 1964.
K.S.T.A. Bull., 1964: 5.

es 106 Kenya Science Teachers' Association
The K.S.T.A. seminar held in the Geology Lecture Theatre, University College, 9:30 a.m. Saturday, May 7th, 1966.
Kenya Sci. Teach. Assoc. [Bull.], Mar. 1967: 2-25.

Papers read deal with topics such as: careers in veterinary science (including work as laboratory technicians) and in the Posts and Telegraphs; the role of the East African Academy in the general education pattern of Kenya; the role of the Nairobi Science Teaching Centre in easing present science teaching problems; the work of the Faculty of Science and the Department of Domestic Science of the University College of Nairobi; the work of the Kenya Science Teachers' College and the Kenya Polytechnic; natural resource and African wildlife education.

es 107 ----- -----
Members' exhibition. K.S.T.A. 1960 conference.
Sci. Teach. Jour. (E.A.), v. 1, no. 5, [Aug.] 1961: 23-31.

Reports on some of the exhibits.

es 108 ----- -----
Summary of physics discussion at K.S.T.A. conference, 1962.
Sci. Teach. Jour. (E.A./Uganda), v. 1, no. 6, Nov. 1963: 38-39.

Curriculum; time-allocation; written work.

es 109 ----- -----
Teachers who attended the K.S.T.A. annual conference, Jan. 1964.
K.S.T.A. Bull., 1964: 8.

Conferences and Meetings

See also: Coe, M. J. (es 27);
Kenya Science Teachers' Association. News and Notes. (es 114).

Journal: K.S.T.A. Bulletin

No entry.

Library

No entry.

News and Notes

es 110 Kenya Science Teachers' Association
Distinguished visiting lecturers.
Kenya Sci. Teach. Assoc. [Bull.], Mar. 1967: 27-28.

Prof. Thobias (anthropologist), Dr. van Praagh (Nuffield Foundation), Mr. Kazutaka Suzuki (Japanese scientist), Dr. Ralph Buchsbaum (Pittsburgh University), Mr. C. J. Wenham (Nuffield Foundation).

es 111 ----- -----
Excerpts from Uganda Science Teachers' Association News Bulletin.
Kenya Sci. Teach. Assoc. [Bull.], Mar. 1967: 45-46.

Members, journal; science fairs.

es 112 ----- -----
June 2.
Kenya Sci. Teach. Bull., v. 4, no. 3, May 1966: 9.

Plans for a Nairobi members meeting - for a discussion on birds, led by Mr. Williams.

es 113 ----- -----
K.S.T.A. news.
K.S.T.A. Bull., 1962.

es 114 ----- -----
K.S.T.A. news.
K.S.T.A. Bull., v. 2, no. 3, Nov. 1963: 1-2.

Annual conference, 1964; affiliation to the Association for Science Education; contacts with Tanganyika Science Teachers' Association and Uganda Science Teachers' Association; Faculty of Engineering, the Royal College; K.S.T.A. branches; students' science congress, 1964; new members.

es 115 ----- -----
May 12 - Professor Hunter.
Kenya Sci. Teach. Bull., v. 4, no. 3, May 1966: 9.

Account of a monthly meeting of Nairobi members. Prof. Hunter lectured on the possibilities for geophysical studies in Nairobi.

es 116 ----- -----
News and notes.
Kenya Sci. Teach. Bull., v. 3, no. 4, Sept. 1964: 8-11.

Nairobi teachers meet; third annual student science congress; Uganda; Future Scientists of Kenya; local science fair (in Nairobi).

es 117 Kenya Science Teachers' Association
Teacher tidbits. K.S.T.A. news.
Kenya Sci. Teach. Bull., v. 3, no. 4, Sept. 1964: 17-19.

Science leaflets for the asking; new products in Nairobi - a 'forever' cell; 3000 periodic charts; K.S.T.A. committee meetings; extracts from minutes of committee meetings; answer for embedding plastic.

es 118 ----- -----
Wanted.
Kenya Sci. Teach. Bull., v. 4, no. 3, May 1966: 18.

A column in which members 'advertise' for materials and advice.

News and Notes

See also Quraishy, N. M. A. (es 186).

Publications and General Articles

es 119 Kenya Science Teachers' Association
The Kenya Science Teachers' Association.
Kenya Sci. Teach. Assoc. [Bull.], Mar. 1967: 40-45.

Early history of the K.S.T.A. and the Students' Science Congresses.

es 120 ----- -----
Students' Science Congress.
Kenya Sci. Teach. Assoc., July 1967. 16 p. mimeo., photographs.

A report on the first National Students' Science Congress, 1st July 1967, giving a commentary on the work, results, costs, and suggestions for 1968.

Publications and General Articles

See also Quraishy, N. M. A. (es 185).

Secretary/Treasurer's Reports and Chairman's Reports and Messages

es 121 Kenya Science Teachers' Association
K.S.T.A. members 1965.
Kenya Sci. Teach. Bull., May 1965: 4.

Membership list.

es 122 Kenya Science Teachers' Association
K.S.T.A. members. August 1966.
Kenya Sci. Teach. Assoc. [Bull.], Mar. 1967: 65-70.

Membership list.

es 123 ----- -----
K.S.T.A. members 1966.
Kenya Sci. Teach. Bull., v. 4, no. 3, May 1966: 10.

Membership list.

es 124 ----- -----
K.S.T.A. membership list. Part II.
Kenya Sci. Teach. Bull., v. 3, no. 4, Sept. 1964: 26.

Part I is in the May 1964 Bulletin.

es 125 ----- -----
Members list.
K.S.T.A. Bull., 1962.

es 126 ----- -----
Presidential address. January 8th, 1964.
Kenya Sci. Teach. Bull., v. 4, no. 1, Jan. 1965: 2-4.

Considers some of the advantages and disadvantages brought about by modern science.

Secretary/Treasurer's Reports and Chairman's Reports and Messages

See also: Hunter, A. N. (es 90);
Russell, E. W. (es 198);
Watson, H. E. (es 278).

Sub-committee, Joint Study Group and Panel Reports

No entry.

es 127 Kenya education commission.
K.S.T.A. Bull., 1964: 3.

es 128 Kenya National Science Foundation
Kenya Sci. Teach. Bull., v. 4, no. 3, May 1966: 2-3.

Plea for an organisation which should (i) ensure that scientifically trained Kenyans have an opportunity to use their training and (ii) work to assure a sufficient supply of adequately trained scientific workers.

es 129 Koinange, Mbiyu (Minister of Education, Kenya)
Letter to the Kenya Science Teachers' Association.
Kenya Sci. Teach. Bull., May 1965: 6.

es 130 Koller, Paul
Lighter than air - a physics project.
K.S.T.A. Bull., 1964: 6.

es 131 ----- -----
A periodic review of the periodic table.
Kenya Sci. Teach. Bull., v. 3, no. 4, Sept. 1964: 15-16.

History of the development of the periodic table.

es 132 ----- -----
1965 Student Science Congress.
Kenya Sci. Teach. Bull., May 1965: 5, 21.

K.S.T.A.

See Kenya Science Teachers' Association.

es 133 Latter, D. A.
The Kilembe mine.
Sci. Teach. Jour. (Uganda), Dec. 1965: 15-21.

History and description of the Kilembe copper mine.

es 134 Lawrence, J. A.
Chemistry teaching at its worst and best.
In Modern Science Teaching, S.T.A.R.T Jour. Supplement, Feb. 1967: 6-8.

es 135 ----- -----
Electrolytes and ionic theory.
S.T.A.R.T. Jour., June 1967: 10-12.

es 136 ----- -----
Science seminar for primary school teachers.
S.T.A.R.T. Jour., June 1967: 5.

es 137 Letters to the editor.
Science Teach. Jour. (E.A.), v. 1, no. 4, 1960: 25.

(i) recommends the book 'Wonders of Astronomy' by J. Sebley; (ii) proposes replacing the journal by a travelling interviewer; (iii) a primary teacher requests advice on the teaching of electricity; (iv) recommends PVC gas tap connectors; (v) requests information about the 'Shields microscope'; (vi) comments on Bro. Thomas' crystal receiver (instructions for making this are found in this journal, v. 1, no. 2); (vii) comments on an American fuel cell; (viii) requests information on simple photography.

es 138 Local ecological information.
Kenya Sci. Teach. Assoc. [Bull.], Mar. 1967: 34-35.

Information on two local works which might be of interest to teachers.

es 139 Loder, J. E.
Small mammals in Uganda.
Sci. Teach. Jour. (Uganda), Dec. 1965: 6-11.

Where to obtain traps, and the construction of simple traps; references on small mammals; short description of several types of small mammal; work in schools.

es 140 Lucas, E.
Field work in biology.
Sci. Teach. Jour. (E.A./Uganda), v. 1, no. 6, Nov. 1963: 15-23.

A study of the development of the flora and fauna of brick-pits near Kampala. A group of students studied the phases of development as un-used brick-pits reverted to an ecological state similar to that of their surroundings.

es 141 ----- -----
The Swynnerton-Burtt memorial prizes. A stimulus to scientific work in schools.
Uganda School Science Review, v. 2, no. 1, Mar. 1953: 12-20.

Suggestions for the type of biological project which might be entered for the annual Swynnerton prize (natural history) and the Burtt prize (botany). Many useful suggestions for individual or group work.

es 142 ----- -----
Teaching about living things.
E.A.S.T.A. Jour., v. 1, no. 1, Sept. 1959: 21-25.

Factors contributing to inadequate field study in school biology courses, with recommendations for projects within the scope of secondary school students.

es 143 Makerere filmstrips.
Sci. Teach. Jour. (E.A.), v. 1, no. 4, 1960: no pagination.

'Generating electricity' and 'Termites' are the subjects of two filmstrips available for school use.

es 144 Mangu air science program.
K.S.T.A. Bull., 1964: 11-12.

es 145 Mathu, F. A.
Kenya's first space scientist, with Project Oscar.
Kenya Sci. Teach. Bull., v. 4, no. 3, May 1966: 11.

A schoolboy amateur radio operator communicates with other amateurs in the U.S.A. by bouncing radio waves off the U.S. Oscar satellite.

es 146 Mbazira, E. S.
Letter to the editor.
Uganda School Science Review, v. 2, no. 1, Mar. 1953: 24-26.

On the need for replacing the dependance of students on memorising with a keenness and ability to reason.

es 147 Miall, P
Logic is not enough.
Kenya Sci. Teach. Bull., May 1965: 10-11.

es 148 A miniature lava-spitting volcano.
Uganda School Science Review, v. 2, no. 1, Mar. 1953: 29.

Constructed from plaster of Paris and using ammonium dichromate.

es 149 Morgan, D. J.
Laboratory technicians for Uganda's schools
Sci. Teach. Jour. (Uganda), July 1966: 25-26.

Brief description of certificates and courses available in Uganda.

es 150 Morgan, David R.
Some reflections on a term of Nuffield chemistry.
S.T.A.R.T. Jour., June 1967: 8-9.

es 151 Morris, John R.
The impact of secondary education upon student attitudes towards agriculture: some preliminary considerations.
Papers of the East Af. Inst. of Social Research, 1966. 25 p. appendices, mimeo.

A progress report on a research study being conducted to determine how secondary schools relate to the surrounding countryside, what they teach in the way of specific agricultural knowledge, and how they affect the students' willingness to enter upon either farming or professional agriculture as a career. A series of tentative conclusions and a series of important questions about customary assumptions on relationships between education, agriculture, and careers are included.

es 152 Morrison, M. E. S.
Succession and climax in East African vegetation.
Sci. Teach. Jour. (Uganda), July 1966: 16-22.

History of the concept of climax and succession, followed by examples from East Africa.

es 153 Morse, E. M.
Model aeroplanes - a lesson in craftsmanship.
S.T.A.R.T. Jour., Mar. 1966: 19.

Some secondary school boys have been constructing control line, free flight, and combat model aeroplanes; many have used locally available materials and original designs.

es 154 Morwood, B.
Biology notes.
E.A.S.T.A. Jour., v. 1, no. 3, Apr. 1960: 27-28.

Notes on collecting and keeping the African square-marked toad (Bufo regularis).

es 155 ----- -----
Higher School Certificate biology.
E.A.S.T.A. Jour., v. 1, no. 2, Dec. 1959: 29-32.

Notes, from six years experience, covering: textbooks, dissecting instruments, microscopes, biology library, and organisation of work.

es 156 ----- -----
Osmosis demonstrations.
Sci. Teach. Jour. (E.A.), v. 1, no. 4, 1960: 12.

(i) the unshelled egg experiment and (ii) a chemical semi-permeable membrane.

es 157 Mulungu, A.
Grade A science teachers.
S.T.A.R.T. Jour., 1965(y): 16-17.

On the problems faced by a Grade A science teacher.

es 158 Muraguri, Nicholas
Natural materials and the chemistry teacher.
K.S.T.A. Bull., v. 2, no. 3, Nov. 1963: 5-8.

Procedural details are outlined for the extraction and purification of organic chemical constituents of plants, using simple apparatus found in almost any school laboratory.

es 159 ----- -----
Periodic chart of the atoms.
Kenya Sci. Teach. Bull., v. 3, no. 4, Sept. 1964: 13-14, 16.

Suggestions on its use, in simplified form, for O-level chemistry.

es 160 Muraguri, Nicholas and M. K. Woolman
Physical science handbook. Second year.
Curriculum Development Centre (Science Section), Nairobi, Mar. 1966. 57 p.

es 161 ----- -----
Scheme of work for second year physics and chemistry.
Nairobi Science Teaching Centre, Aug. 1964. 23 p.

es 162 Mushi, G. S.
Biology teaching in a secondary school.
S.T.A.R.T Jour., July 1966: 8-9.

Nairobi Science Teaching Centre

See Curriculum Development Centre (Science Section), Nairobi.

es 163 Norman, G. C.
An experiment to illustrate the relation force = rate of change of momentum.
S.T.A.R.T. Jour., v. 2, no. 1, Jan. 1964: 15-17.

es 164 ----- -----
First aid in the school laboratory.
Nairobi Science Teaching Centre, Aug. 1965. 10 p. mimeo.

General notes; shock; wounds; burns and scalds; eye injuries; poisoning; electric shock; the first aid box; artificial respiration.

es 165 ----- -----
'Good' and 'bad' physics lessons contrasted.
In Modern Science Teaching, S.T.A.R.T. Jour. Supplement, Feb. 1967: 3-5.

See also Webb, N. G. G. (es 283).

Contrasts the topic extension of springs; comments are given showing why one approach is poor.

es 166 ----- -----
Nuffield Physics.
S.T.A.R.T. Jour., June 1967: 16.

es 167 ----- -----
Physics handbook. Fourth year.
Curriculum Development Centre (Science Section), Nairobi, Mar. 1967. 74 p.

es 168 ----- -----
Physics handbook. Third year.
Nairobi Science Teaching Centre, Dec. 1965. 122 p.

es 169 Norman, G. C.
Safety in school laboratories. A guide for science teachers.
Nairobi Science Teaching Centre, Apr. 1965. 12 p. mimeo.

General; electricity; fire; explosions; toxic gases; poisons; other chemicals requiring special storage and handling; glass; pressure and vacuum; radioactive material and x-rays; animals; bacteria; field work; sharp tools and instruments; suggested laboratory regulations.

es 170 ----- -----
Scheme of work for fourth year physics.
Curriculum Development Centre (Science Section), Nairobi, Jan. 1967. 22 p.

es 171 ----- -----
Scheme of work for third year physics.
Nairobi Science Teaching Centre, Dec. 1965. 25 p.

es 172 ----- -----
Suggestions for School Certificate syllabus revision.
S.T.A.R.T. Jour., 1965(y): 16.

Letter to the editor on the poor response to the request for suggestions on School Certificate syllabus revision.

es 173 Norman, G. C. and Basil H. G. Chaplin
The science panels of the Institute of Education.
In Modern Science Teaching, S.T.A.R.T. Jour. Supplement, Feb. 1967: 12-16.

See also Webb, N. G. G. (es 283).

A brief summary of the history, recommendations and future proposals of the science panels of the Institute of Education, University College, Dar es Salaam.

es 174 Operation ecology.
K.S.T.A. Bull., 1962.

es 175 Paltridge, H.
Report on a science seminar at Musoma.
S.T.A.R.T. Jour., June 1967: 4.

es 176 Patel, I. A.
Some suggestions for improvement in the teaching of physical science in the (Asian) secondary schools of Uganda in light of a study of the teaching of science in secondary schools in Great Britain.
Associateship Report, Institute of Education, University of London, Nov. 1962. 193 p. diagrs., biblio., appendices.
LIE

es 177 Patel, S. M.
The teaching of science in secondary schools of Great Britain with reference to problems in Indian secondary schools of Uganda.
Associateship Report, Institute of Education, University of London, Aug. 1954. 155 p. diagrs., biblio., appendices.
LIE

es 178 Pearce, D. H.
Entebbe science workshop 1965.
Sci. Teach. Jour. (Uganda), Dec. 1965: 4-6.

Brief report on a workshop organised by E.S.I. and a resumé of the involvement of E.S.I. in primary school work in the U.S.A. and Africa.

es 179 'Pelmet'
Below zero.
S.T.A.R.T. Jour., v. 1, no. 1, Sept. 1963: 7, 12.

es 180 Perry, X.
What's your hypothesis?
Sci. Teach. Jour. (E.A.), v. 1, no. 4, 1960: 13.

The problem of how the earth and moon influence each other.

es 181 Pratt, R. C.
Science at the University College, Dar es Salaam.
S.T.A.R.T. Jour., v. 2, no. 3, Aug. 1964: 17, 20.

es 182 Preston, W.
Electrano.
Sci. Teach. Jour. (E.A.), v. 1, no. 5, [Aug.] 1961: 32-33.

A kit which has been found useful in teaching electricity.

es 183 Proposed revision of Cambridge Advanced Level physics syllabus.
S.T.A.R.T. Jour., v. 2, no. 3, Aug. 1964: 10-11.

es 184 Quiggin, P. V. M.
Tecoma stans.
Sci. Teach. Jour. (E.A./Uganda), v. 1, no. 6, Nov. 1963: 24-28.

Notes on a syllabus alternative to jacaranda (which does not grow well in all areas).

es 185 Quraishy, N. M. A.
Rules and regulations of K.S.T.A.
K.S.T.A. Bull. (Conference Issue), [Jan.] 1964: 1.

Constitution of the Kenya Science Teachers' Association.

es 186 Quraishy, N. M. A.
Science notes.
Kenya Sci. Teach. Bull., v. 4, no. 1, Jan. 1965: 13-16.

Determination of the latent heat of steam; taking photographs with a pin-hole camera; a convincing demonstration of the perils of smoking; demonstrating Brownian movement; showing atmospheric pressure.

es 187 Randhawa, R. S.
A study of science teaching in the primary and secondary (with special reference to science up to G.C.E. O-level) in England and Kenya Asian schools.
Associateship Report, Institute of Education, University of London, 30 June 1961. 218 p. appendices.
LIE

es 188 Raval, D. J.
A study of the curriculum and methods of science teaching in English schools in relation to the problems of science teaching in Asian schools in Uganda.
Associateship Report, Institute of Education, University of London, 20 July 1953. 185 p. tables, diagrs., appendices.
LIE

es 189 Report of the Biology Sub-committee on the replies received from the British East African Territories to the Secretary of State's Dispatch on the place of biology in education.
Colonial Office, Advisory Committee on Education in the Colonies, 1933.
LIE

es 190 Report on the curriculum development conference held at the Curriculum Development and Research Centre, in Nairobi, between 19th and 22nd December 1966.
Kenya Sci. Teach. Assoc. [Bull.], Mar. 1967: 52-62.

A very complete picture of the work in curriculum development in Tanzania, Kenya, and Uganda is put forth; including work with Nuffield Science, the Unesco Biology Project, educational radio and television, etc.

es 191 Report on the Students' Science Congress.
K.S.T.A. Bull., 1962.

es 192 Roberts, J. R.
Geography a science?
S.T.A.R.T. Jour., v. 2, no. 2, Apr. 1964: 7-8.

es 193 Robinson, Dave F.
Approach to the use of the potometer in water relations experiments.
S.T.A.R.T. Jour., 1965(y): 14-15.

Two experiments to make the interpretation of potometer experiments more meaningful.

es 194 Robinson, Dave F.
Biology lessons.
In Modern Science Teaching, S.T.A.R.T. Jour. Supplement, Feb. 1967: 8-11.

See also Webb, N. G. G. (es 283).

Two groups of lessons are given, one in which there is little preparation and teaching is to the class rather than to the individual, the other is intended to be a 'discovery approach'.

es 195 ----- -----
Examination marking techniques.
S.T.A.R.T. Jour., 1965(y): 8-9.

Explanation of how marks are lost or gained in Cambridge biology examinations; shows teachers important points to emphasize, e.g. style in diagrams, to help their pupils pass well.

es 196 Rogers, Robert E.
A problem-solving experience and some comments on science teaching.
Newsletter, Makerere University College, v. 2, no. 1, 27 Apr. 1967: 13-16.

es 197 ----- -----
Revolution in science education.
S.T.A.R.T. Jour., July 1966: 3-5.

es 198 Russell, E. W.
Presidential address to the Kenya Science Teachers' Association given by Dr. E. W. Russell, 24th August, 1960.
Sci. Teach. Jour. (E.A.), v. 1, no. 5, [Aug.] 1961: 1-22.

Problems faced by science teachers; the role of science in East Africa; scientific research in East Africa.

es 199 Saunders, I. W. L.
Visual and audio teaching aids.
Sci. Teach. Jour. (Uganda), Dec. 1966: 13-18.

Description of various types of teaching aids with primary emphasis on teaching machines.

es 200 Scholes, Roger
Air-conditioned termite nests.
K.S.T.A. Bull. (Conference Issue), [Jan.] 1964: 6-7.

On the methods whereby termites establish microclimates suited to their needs.

es 201 Scholes, Roger
Some botanical illustrations for School Certificate (E.A.). Nairobi Science Teaching Centre, Nov. 1963. 45 p. mimeo.

Botanical illustrations of sixty three plants found in East Africa.

es 202 Science education for girls.
Kenya Sci. Teach. Bull., v. 3, no. 4, Sept. 1964: 28-29.

The position of science education for girls in Kenya secondary schools is briefly outlined.

SCIENCE TEACHERS' ASSOCIATION OF THE REPUBLIC OF TANZANIA

Also known as S.T.A.R.T.

Conferences and Meetings

es 203 Science Teachers' Association of the Republic of Tanzania
Annual general meeting and conference 1965.
S.T.A.R.T. Jour., Mar. 1966: 3-6.

es 204 ----- -----
Annual general meeting and conference 1966 - a summary.
S.T.A.R.T. Jour., Dec. 1966: 5-9.

es 205 ----- -----
Summary of the proceedings of the annual general meeting, December 7th, 1964.
S.T.A.R.T. Jour., 1965(y): 3-7.

Conferences and Meetings

See also: Hilton, M. J. (es 82);
Webb, N. G. G. (es 286).

Journal: S.T.A.R.T Journal

No entry.

Library

No entry.

News and Notes

es 206 Science Teachers' Association of the Republic of Tanzania
News from the regions.
S.T.A.R.T. Jour., June 1967: 20.

es 207 ----- -----
News in brief.
S.T.A.R.T. Jour., v. 1, no. 1, Sept. 1963: 8.

News and Notes

See also Hilton, M. J. (es 83).

Publications and General Articles

es 208 Science Teachers' Association of the Republic of Tanzania
The Science Teachers' Association of the Republic of Tanzania Constitution (approved and revised 18 August 1966).
Science Teachers' Association of the Republic of Tanzania, 1966. 1 p. mimeo.

Secretary/Treasurer's Reports and Chairman's Reports and Messages

No entry.

Sub-committee, Joint Study Group and Panel Reports

No entry.

es 209 'A Science Tutor'
Practical work in teaching science. Part II.
Uganda School Science Review, v. 2, no. 1, Mar. 1953: 6-11.

Some ideas for extending practical work even in the face of a shortage of equipment and laboratories. Contains useful hints on improvisation regarding chemicals and apparatus.

es 210 A short course in elasticity.
S.T.A.R.T. Jour. (A.G.M. Supplement), Dec. 1964: 7-9.

Suggestions for three single and three double periods of practical work and discussion, using modern materials.

es 211 Small-scale methods.
E.A.S.T.A. Jour., v. 1, no. 1, Sept. 1959: 14-17.

Advocates small-scale work in organic and inorganic preparations, resulting in economy of time and finance. Also recommends books and equipment.

es 212 Some of the observations of the K.S.T.A. representative to the East African Academy symposium held at Makerere College, Kampala, over 21st and 22nd September, 1966.
Kenya Sci. Teach. Assoc. [Bull.], Mar. 1967: 25-27.

es 213 Some sources of supply.
Sci. Teach. Jour. (E.A./Uganda), v. 1, no. 6, Nov. 1963: 29-30.

Sawa multi-meters for electrical measurements - a consumer report.

es 214 Soundy, W. W.
Report on science teachers' conference at Makerere College, Uganda, Feb. 1944.
East Africa Pamphlet No. 327, Feb. 1944. 8 p.
COL

Report of an East African science teachers' conference held to consider: (i) the aims of a scientific education in relation to local conditions and to the various stages at which formal education is discontinued; (ii) the present methods used in pursuance of the aims expressed; (iii) the possibilities of improving existing methods; (iv) the advisability of specialization during secondary education; and (v) to consider whether or not outlines of difficult and/or tentative scientific theories should be given at elementary stages. Syllabus revision is not considered. Resolutions are given.

es 215 Space science lectures.
Kenya Sci. Teach. Bull., v. 3, no. 4, Sept. 1964: 7-8.

Itinerary and description of the National Aeronautical and Space Administration (U.S.A.) lectures by John Twitty.

S.T.A.R.T.

See Science Teachers' Association of the Republic of Tanzania.

es 216 Stimac, Michael
An appeal to all members.
Kenya Sci. Teach. Bull., v. 4, no. 1, Jan. 1965: 12.

An appeal for cooperation in the work of the Association.

es 217 ----- -----
Construction of the wave machine.
K.S.T.A. Bull., v. 2, no. 3, Nov. 1963: 12-15.

Construction details for a wave machine, to show simple harmonic motion, using the torsion rod method. Possible uses are outlined.

es 218 ----- -----
K.S.T.A. can help.
Kenya Sci. Teach. Bull., v. 3, no. 4, Sept. 1964: 2-3.

Ways in which K.S.T.A. can help in fulfilling the national goals of Kenya.

es 219 Stoever, William A.
Revision of H.S.C. physics syllabus.
S.T.A.R.T. Jour., v. 2, no. 3, Aug. 1964: 14.

es 220 Straeter, F. J.
The place of biology in East African education
Uganda Teach. J. v. 1, 1939: 92-94.
LIE

es 221 1967 Students Science Congress
Kenya Sci. Teach. Assoc. [Bull.], Mar. 1967: 33-34.

Proposals and recommendations.

es 222 Subarsky, Zachariah
An early experiment in gastric digestion worth quoting.
K.S.T.A. Bull., 1964: 9-10.

es 223 ----- -----
Ecology - A challenge to the biology teacher.
S.T.A.R.T. Jour., v. 2, no. 3, Aug. 1964: 4-6.

es 224 ----- -----
Ecology - A challenge to the biology teachers.
Kenya Sci. Teach. Bull., v. 3, no. 4, Sept. 1964: 22-25.

Ecology is becoming a point of major emphasis in biology. Reasons for the inclusion of ecology in secondary school biology are put forth.

es 225 ----- -----
From field and laboratory to classroom. Sex attractants in insects.
S.T.A.R.T. Jour., v. 2, no. 1, Jan. 1964: 4-5.

es 226 ----- -----
From the lab and field to classroom.
Kenya Sci. Teach. Bull., v. 4, no. 3, May 1966: 4-7.

Enzymes - information at a level suitable for secondary school pupils on the relationship between the structure of enzyme molecules and their actions.

es 227 ----- -----
The Kenya science project.
Kenya Ed. J., v. 1, no. 10, Nov. 1962: 14-16.
IEN, LIE

A description of a science teaching improvement project in Kenya which was organized for teachers in the field. Refresher courses concentrated on teaching basic concepts through the subject fields and on learning hand-tool skills which would ostensibly enable teachers to make equipment for science teaching.

es 228 ----- -----
The Kenya science project.
S.T.A.R.T. Jour., v. 2, no. 2, Apr. 1964: 15-20.

es 229 Subarsky, Zachariah
Light and life.
Kenya Sci. Teach. Bull., May 1965: 14-17.

es 230 ----- -----
Science education, East Africa.
Sci. Teach., v. 32, Feb. 1965: 40-41.

es 231 ----- -----
Seminar on marine biology.
Kenya Sci. Teach. Bull., v. 4, no. 1, Jan. 1965: 5-12.

A seminar, arranged by the U.S. State Dept. on the occasion of the calling in of the oceanographic vessel 'Anton Brunn', which has been engaged in a biological survey of the western Indian Ocean. Reports on the work of eight experts which accompanied the vessel are included.

es 232 ----- -----
Sex attractants in insects.
K.S.T.A. Bull., v. 2, no. 3, Nov. 1963: 9-10.

Calls attention to the importance of sex attractants in insect reproduction and insect control. Information is given on release, detection, amounts required, times of release and practical uses of insect attractants.

es 233 'Surmog'
Atomic rays - as food preservatives.
S.T.A.R.T. Jour., v. 2, no. 2, Apr. 1964: 9.

es 234 T.A.M.
Ecology must live. A crow.
Kenya Sci. Teach. Assoc. [Bull.], Mar. 1967: 33.

A student's 'observation' (or lack of) of the growth and development of a crow - taken from a Cambridge School Certificate examination trial paper.

es 235 ----- -----
Problems in teaching ecology at School Certificate level.
Kenya Sci. Teach. Assoc. [Bull.], Mar. 1967: 30-32.

Lack of knowledge; organisation; cost; time; identification of material; terminology.

es 236 Tarimu, C. L. (Minister of Education, Tanzania)
To science teachers of Tanzania.
In Modern Science Teaching, S.T.A.R.T. Jour. Supplement, Feb. 1967: 1.

See also Webb, N. G. G. (es 283).

Urges science teachers to take an active part in the development of science education in Tanzania.

es 237 Taylor, R. P.
Physics notes.
Sci. Teach. Jour. (Uganda), July 1966: 33-34.

Childs play (about apparatus); sound apparatus; pedalling a bicycle at the speed of 'E'.

es 238 Thomas, Brother
A beginner's one-valve receiver.
E.A.S.T.A. Jour., v. 1, no. 3, Apr. 1960: 5-17.

Equipment needed, construction of coil, assembly, adjustment, and use of a 60 meter broadcast band receiver. Includes both a pictorial and a schematic diagram.

es 239 ----- -----
A flexible crystal receiver.
E.A.S.T.A. Jour., v. 1, no. 2, Dec. 1959: 20-24.

How to assemble, use, and get the best out of a receiver made from simple materials. Includes a circuit diagram and a drawing of the completed receiver.

es 240 ----- -----
Third wireless project. A sound amplifier.
Sci. Teach. Jour. (E.A.), v. 1, no. 4, 1960: 14-21.

Acquisition of relatively simple parts and the construction and use of a sound amplifier. Includes schematic and pictorial diagrams.

es 241 Trowell, M.
Scientific diagrams.
Uganda School Science Review, v. 2, no. 1, Mar. 1953: 20-23.

Practical hints for teachers as to how they should help their pupils avoid some common faults in science diagrams.

es 242 Unesco Biology Pilot Project on the new approaches and techniques in biology teaching in Africa.
Kenya Sci. Teach. Assoc. [Bull.], Mar. 1967: 46-52.

A description of the project and notes on the first meeting of the permanent study group of Kenya.

es 243 Uganda, Government of
Primary school syllabus.
Ministry of Education, Kampala, 1965. 204 p.

See particularly: Number, 24-26; Nature Study and Health Education, 27-30; Mathematics, 93-110; Science, 111-122.

es 244 Uganda, Ministry of Education
101 Openings for senior IV leavers.
Ministry of Education, Kampala, Dec. 1965. 68 p.

Details and qualifications necessary for a wide variety of jobs which are open to students with passes in the Cambridge School Certificate examinations. Many of the positions are in technical and scientific areas.

UGANDA SCIENCE TEACHERS' ASSOCIATION

Also known as U.S.T.A.

Note: The East African Science Teachers' Association is also listed under the Uganda Science Teachers' Association because of the close former connections between the E.A.S.T.A. Jour. and the Science Teachers' Jour.

Conferences and Meetings

See: Bowles, J. M. (es 16);
Uganda Science Teachers' Association. News and Notes. (es 257 - es 259).

Journal: Science Teachers' Journal

Formerly known as (and successor to) The East African Science Teachers' Association Journal.

es 245 East African Science Teachers' Association
Editorial.
E.A.S.T.A. Jour., v. 1, no. 1, Sept. 1959: 6-7.

On the need for science teachers to have (i) an opportunity to meet and talk and (ii) a journal for interchange of ideas.

es 246 ----- -----
Editorial.
Sci. Teach. Jour. (E.A.), v. 1, no. 4, 1960: 1-2.

'Science holds the thread of survival - the great importance of science in society.'

Journal: Science Teachers' Journal

See also: Creaser, H. (es 36);
Hall, J. R. (es 74, es 75).

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No entry.

News and Notes

es 247 East African Science Teachers' Association
Biology notes.
E.A.S.T.A. Jour., v. 1, no. 2, Dec. 1959: 28.

Eucalyptus globulus.

es 248 ----- -----
Chemistry notes.
E.A.S.T.A. Jour., v. 1, no. 1, Sept. 1959: 17-18.

More durable rubber teats constructed from plastic tubing; use of barium hydroxide solution for identifying carbon dioxide; simple Kipps apparatus.

es 249 ----- -----
Chemistry notes.
E.A.S.T.A. Jour., v. 1, no. 2, Dec. 1959: 27-28.

Hydrogen generator, with diagrams; the most portable Kipp in the world.

es 250 ----- -----
News.
E.A.S.T.A. Jour., v. 1, no. 2, Dec. 1959: 30-31.

News from the four branches: Kenya, Uganda, Tanganyika, and Zanzibar.

es 251 ----- -----
Notes from the Territories.
E.A.S.T.A. Jour., v. 1, no. 2, Dec. 1959: 33.

Uganda; Kenya.

es 252 ----- -----
Physics notes.
E.A.S.T.A. Jour., v. 1, no. 1, Sept. 1959: 19-20.

Smoke precipitator; to show the relationship between a solution carrying a current and a wire carrying a current; a simple microphone; a simple voltameter.

es 253 ----- -----
Physics notes.
Sci. Teach. Jour. (E.A.), v. 1, no. 4, 1960: 33-34.

Wheatstone bridges and potentiometers - locally constructed at 25% of the cost of imported products; wave study - how to produce slow motion transverse waves; how to prevent Bunsen burners from going out; focal length of a concave lens - an alternative method.

es 254 Uganda Science Teachers' Association
Biology notes.
Sci. Teach. Jour. (Uganda), Dec. 1966: 37.

Breeding small mammals.

es 255 ----- -----
Biology notes
Sci. Teach. Jour. (Uganda), July 1967: 35.

Preservation of birds by the injection of formaldehyde.

es 256 ----- -----
Chemistry notes.
Sci. Teach. Jour. (Uganda), July 1967: 36-40.

Electrolysis demonstrations - general; electrolysis of brine using a mercury cathode; small-scale gas generator; semi-micro bottle racks; kinetic simulator (change of state, effect of pressure on boiling point, fractional distillation, Brownian motion).

es 257 ----- -----
News and views.
Sci. Teach. Jour. (Uganda), July 1966: 7-10.

Schools science fair; science lectures; 6th annual conference; physical science curriculum conference; the Christian in a scientific age; hampered by tradition?; apparatus.

es 258 ----- -----
News and views.
Sci. Teach. Jour. (Uganda), Dec. 1966: 9-13.

The U.S.T.A. annual conference; aeronomy to butterflies; 1967 program; history of the Association; teaching aids and apparatus; Unesco Biology Teaching Project; the East Africa Academy symposium; science for all.

es 259 ----- -----
News and views.
Sci. Teach. Jour. (Uganda), July 1967: 9-16.

Malawi on the move; Kenya and Tanzania science teachers' associations; Unesco - new sourcebook - chemistry trends; science fairs in Uganda, 1967; course for Uganda physics teachers; physics working party; science for all - against; science for all - for these reasons; U.S.T.A. annual conference 1967; apparatus, equipment, and materials; information sheets.

es 260 Uganda Science Teachers' Association
Physics notes.
Sci. Teach. Jour. (Uganda), Dec. 1966: 38.

Conservation of energy; examiner's reports.

es 261 ----- -----
Physics notes.
Sci. Teach. Jour. (Uganda), July 1967: 40-41.

Use of roofing bolts as electrical connectors; facts and figures.

es 262 ----- -----
Queries in physics.
Sci. Teach. Jour. (Uganda), Dec. 1965: 12-15.

Queries and answers to queries.

es 263 ----- -----
Queries in physics.
Sci. Teach. Jour. (Uganda), Dec. 1966: 34-37.

Queries and answers to queries.

es 264 ----- -----
Queries in physics.
Sci. Teach. Jour. (Uganda), July 1966: 27-30.

Queries and answers to queries.

es 265 ----- -----
Queries in physics.
Sci. Teach. Jour. (Uganda), July 1967: 33-35.

Queries and answers to queries.

News and Notes

See also: Barraclough, G. W. (es 9);
Creaser, H. (es 37);
Eeles, G. C. (es 53);
Elwick, J. S. (es 54);
Taylor, R. P. (es 237).

Publications and General Articles

es 266 Uganda Science Teachers' Association
Survey of textbooks.
Sci. Teach. Jour. (Uganda), June 1965: 22-28.

Books considered suitable for use in general science, physics, chemistry, and biology, including a brief list of science textbooks written specifically for use in tropical schools.

es 267 Uganda Science Teachers' Association
The text-book survey.
Sci. Teach. Jour. (Uganda), Dec. 1965: 30-31.

Supplement to a survey in the June 1965 issue of the Sci. Teach. Jour. Gives available texts and their costs.

Secretary/Treasurer's Reports and Chairman's Reports and Messages

es 268 East African Science Teachers' Association
Sixth form Science.
E.A.S.T.A. Jour., v. 1, no. 1, Sept. 1959: 8-13.

Summary of the inaugural lecture by Prof. E. Lucas given to the science refresher course held at the Institute of Education, Makerere College, Jan. 1959. Considers the principles desirable in science education at the sixth form level, bearing in mind the needs of those who will go on to further work in science and those who will not.

Sub-committee, Joint Study Group and Panel Reports

No entry.

es 269 Uganda science fair - Feb. 19-21, 1964.
K.S.T.A. Bull., 1964: 4.

es 270 U.M.A.T.T. United Missionary Air Training and Transport.
Kenya Sci. Teach. Bull., May 1965: 19-21.

See Mangu air science program. Kenya Sci. Teach. Bull., 1964. (es 144).

es 271 University College, Dar es Salaam, Institute of Education
Curriculum workshop - January 1967. Report of the physics panel.
Institute of Education, University College, Dar es Salaam, n.d. 21 p. mimeo.

The present syllabus and its problems; why teach physics; why teach physics in Tanzania; general principles; testing; ideal physics syllabus for Tanzania; problems involved in adaptation of Nuffield physics; a recommended course in physics; summary of recommendations.

U.S.T.A.

See Uganda Science Teachers' Association.

es 272 Wagner, D.
Modern knowledge about photosynthesis.
Sci. Teach. Jour. (Uganda), June 1965: 9-14.

The simple, traditional equation for photosynthesis leads to some incorrect ideas on photosynthesis. Photosynthesis in the light of modern knowledge is explained.

es 273 ----- -----
Respiration in school biology.
Sci. Teach. Jour. (Uganda), Dec. 1965: 24-29.

Fundamental details of respiration and further details for H.S.C.

es 274 Warburton, Robert
Chemistry handbook. Fourth year.
Curriculum Development Centre (Science Section), Nairobi, Jan. 1966. 44 p.

es 275 ----- -----
Chemistry handbook. Third year.
Curriculum Development Centre (Science Section), Nairobi July 1966. 65 p.

es 276 ----- -----
Scheme of work for fourth year chemistry.
Curriculum Development Centre (Science Section), Nairobi, Jan. 1967. 34 p.

es 277 ----- -----
Scheme of work for third year chemistry.
Curriculum Development Centre (Science Section), Nairobi, July 1966. 31 p.

es 278 ----- -----
Teaching chemistry without a laboratory.
Kenya Sci. Teach. Assoc. [Bull.], Mar. 1967: 35-38.

Notes on the construction and use of inexpensive chemical apparatus.

es 279 Watson, H. E.
Presidential address to K.S.T.A. 23 April 1958.
E.A.S.T.A. Jour., v. 1, no. 2, Dec. 1959: 6-18.

Discusses the problems of science education in East Africa and considers these problems in relation to the Science Masters' Association (U.K.) policy statement of 1957. The problem of implementation of the recommendations is also considered.

es 280 The wave machine.
K.S.T.A. Bull., 1962.

es 281 Webb, N. G. G.
The enthusiasm of Grade A science teachers. A report by the chairman.
S.T.A.R.T. Jour., Nov. 1965: 13.

An appeal for experienced science teachers to write articles on topics which have been suggested by the Grade A teachers.

es 282 ----- -----
Modern physics.
S.T.A.R.T. Jour., v. 2, no. 3, Aug. 1964: 21, 8.

es 283 ----- -----, ed.
Modern science teaching.
S.T.A.R.T. Jour. Supplement, Feb. 1967. 20 p.
BC

See also: Anderson, H. (es 6);
Bishop, G. D. and Y. A. Pentin (es 15);
Lawrence, J. A. (es 134);
Norman, G. C. (es 165);
Norman, G. C. and Basil H. G. Chaplin (es 173);
Robinson, Dave F. (es 194).

es 284 ----- -----
O-level science in everyday life.
S.T.A.R.T. Jour., Mar. 1966: 16-17.

Suggests that positive efforts should be made to counteract the current lack of interest in technology; lists some things which a school laboratory should have for demonstrating applications of science.

es 285 ----- -----
Science panels for syllabus revision.
S.T.A.R.T. Jour., Mar. 1966: 9-11.

Panels to review everything connected with the syllabus and teaching for science subjects at the primary, School Certificate and H.S.C. levels; composition of the panels and some of their preliminary recommendations.

es 286 ----- -----
Summary of the minutes of the first annual general meeting of S.T.A.R.T. held on 5th December, 1963 at Jangwani Girls Secondary School, Dar es Salaam.
S.T.A.R.T. Jour., v. 2, no. 1, Jan. 1964: 6-8.

es 287 ----- -----
Your comments sought on electrostatics.
S.T.A.R.T. Jour., v. 2, no. 2, Apr. 1964: 13.

es 288 Whittle, P. A.
Introducing modern physics.
Sci. Teach. Jour. (Uganda), July 1967: 29-33.

Problems and methods at the S.C. and H.S.C. level. A design for a simple Geiger counter is included.

es 280 Woods, Brian E.
Some ideas on improving the teaching of biology in the schools of Africa.
S.T.A.R.T. Jour. (A.G.M. Supplement), Dec. 1964: 4-5.

On the provision of a school museum and zoo.

es 290 Woolman, M. K.
Construction of a simple pipette rack.
K.S.T.A. Bull. (Conference Issue), [Jan.] 1964: 10-11.

es 291 ----- -----
Flotation stick.
K.S.T.A. Bull. (Conference Issue), [Jan.] 1964: 8-9.

Uses and construction details.

es 292 ----- -----
Report on a course for Uganda physics teachers, 25-28 April, 1967.
Makerere University College, n.d. 2 p. mimeo.

Report on a course held to introduce the ideas of Nuffield O-level physics. As a result of this course a working party was formed. Notes are produced by each monthly meeting of the working party.

es 293 ----- -----
Some recent developments in science teaching.
Sci. Teach. Jour. (Uganda), Dec. 1965: 21-23.

African Primary Science Program; Nuffield Foundation Science Teaching Project; revision of Cambridge S.C. science syllabuses.

es 294 ----- -----
Some recent developments in science teaching.
S.T.A.R.T. Jour., Mar. 1966: 23.

Refers to the Nuffield Science Programme and the School Certificate examinations.

es 295 ----- -----
Survival in space.
K.S.T.A. Bull., v. 2, no. 3, Nov. 1963: 3-4.

Review of the conditions which must be met in order to make it possible for a man to survive inside a spacecraft.

es 296 Woolman, M. K.
What is an inert gas?
K.S.T.A. Bull. (Conference Issue), [Jan.] 1964: 2.

The statement 'inert gases cannot form compounds' has been proven false through the discovery of compounds of inert gases. Information on some of these compounds is given.

es 297 Yaffe, Phil
Lets stop teaching sloppy science.
S.T.A.R.T. Jour., Dec. 1966: 14.

The information teachers attempt to convey is not always as clear and concise as they believe. Examples in optics are given in illustration of this point.

es 298 Your butterflies mounted.
S.T.A.R.T. Jour., June 1967: 9.

CENTRAL AFRICA
(SCIENCE)

cs 1 Allen, W.
Flat glass.
Proc. of S.D.S.T.A., 1957: [6-9].

History; physical properties; ingredients; manufacture of various types of glass.

cs 2 Alves, Dr.
Bilharziasis in Southern Rhodesia.
Proc. of S.D.S.T.A., 1957: [17].

Bilharziasis is becoming an increasingly grave problem with the development of water resources. Groups have been set up to study and attempt to control bilharziasis.

cs 3 Aphire, G. and E. Mabugu
The Goat-sucker.
Fed. Sci. Teach. J., v. 3, no. 1, 1962: 86-88.

Observations on the African nightjar by two teachers.

cs 4 Archer, C. B.
Time.
Jour. of A.S.E.C.A., v. 4, 1963: 20-22.

Problem of the calendar; measurement of small intervals of time by various types of 'clock'.

cs 5 Argani, J.
Silicon and silicones.
Jour. of S.D.S.T.A., v. 2, no. 1, 1958: [13-15].

History, chemical and physical properties.

A.S.E.C.A.

See Association for Science Education in Central Africa.

ASSOCIATION FOR SCIENCE EDUCATION IN CENTRAL AFRICA

Also known as A.S.E.C.A.

Formerly known as The Federal Science Teachers' Association.

Successor to The Salisbury and District Science Teachers' Association.

Conferences and Meetings

No entry.

Journal: The Journal of A.S.E.C.A.

Formerly known as The Federal Science Teachers' Journal.

Successor to The Proceedings of the Salisbury and District Science Teachers' Association.

cs 6 Salisbury and District Science Teachers' Association
Diffidence or apathy?
Jour. of S.D.S.T.A., v. 2, no. 1, 1958: [1-2].

Journal: The Journal of A.S.E.C.A.

See also: Gilbert, P. G. S. (cs 82).

Library

No entry.

News and Notes

cs 7 Federal Science Teachers' Association
The Bulawayo scene.
Fed. Sci. Teach. J., v. 1, no. 1, 1960: 67.

A summary of a report from the Bulawayo and District Science Teachers' Association.

cs 8 ----- -----
The Bulawayo scene.
Fed. Sci. Teach. J., v. 2, no. 1, 1961: 63.

Short report from the Bulawayo branch of the Federal Science Teachers' Association.

cs 9 ----- -----
The Bulawayo scene.
Fed. Sci. Teach. J., v. 3, no. 1, 1962: 116.

Notes from the Bulawayo and District Science Teachers' Association.

cs 10 Salisbury and District Science Teachers' Association
Constitution of committees. Meetings of the Association 1956-57.
Proc. of S.D.S.T.A., 1957: [1].

List of the committee members and the meetings of the Association.

cs 11 Salisbury and District Science Teachers' Association
Meetings and events 1957/58.
Jour. of S.D.S.T.A., v. 2, no. 1, 1958: [7].

A list.

cs 12 ----- -----
News from Salisbury and Districts.
Fed. Sci. Teach. J., v. 1, no. 1, 1960: 64-66.

Annual report by the chairman of the Salisbury and District Science Teachers' Association; summary of receipts and payments.

News and Notes

See also Travers, et. al. (cs 229).

Publications and General Articles

See de Bruijn, P. F. (cs 60).

Secretary/Treasurer's Reports and Chairman's Reports and Messages

cs 13 Salisbury and District Science Teachers' Association
Annual report by the Chairman of the Salisbury and District Science Teachers' Association.
Fed. Sci. Teach. J., v. 2, no. 1, 1961: 52-55.

cs 14 ----- -----
Annual report by the Chairman of the Salisbury and District Science Teachers' Association.
Jour. of A.S.E.C.A., v. 4, 1963: 79-81

cs 15 ----- -----
Chairman's annual report, 1957/58.
Jour. of S.D.S.T.A., v. 2, no. 1, 1958: [3-5].

Review of the work of the Association during the year with suggestions for the future.

cs 16 ----- -----
Chairman's annual report, 1958/59.
Jour of S.D.S.T.A., v. 3, no. 1, 1959: [3-6].

Activities of the Association.

cs 17 ----- -----
Salisbury and District Science Teachers' Association
Chairman's annual report.
Fed. Sci. Teach. J., v. 3, no. 1, 1962: 92-94.

cs 18 Salisbury and District Science Teachers' Association
Treasurer's report 1958.
Jour. of S.D.S.T.A., v. 2, no. 1, 1958: [6].

cs 19 ----- -----
Treasurer's report 1959.
Jour. of S.D.S.T.A., v. 3, no. 1, 1959: [7].

Secretary/Treasurer's Reports and Chairman's Reports and Messages

See also: Association for Science Education in Central Africa. News and Notes. (cs 12);
Maasdorp, L. (cs 132).

Sub-committee, Joint Study Group and Panel Reports

cs 20 Salisbury and District Science Teachers' Association
Cambridge Oversea H.S.C. subsidiary biology syllabus and examination. Provisional report of sub-committee.
Jour. of S.D.S.T.A., v. 3, no. 1, 1959: [27-29].

Importance attached to subsidiary biology; dissatisfaction with the present syllabus and examination; recommendations.

cs 21 ----- -----
Cambridge Overseas H.S.C. subsidiary biology syllabus and examination. 1960 Report of sub-committee.
Fed. Sci. Teach. J., v. 1, no. 1, 1960: 47-51.

A proposed H.S.C. subsidiary biology syllabus which has been submitted to the Cambridge Syndicate is given.

cs 22 ----- -----
Laboratory planning for schools in the Federation.
Fed. Sci. Teach. J., v. 1, no. 1, 1960: 52-63.
Also published in mimeographed form under the same title.
Feb. - Aug. 1960. 11 p. diags.

A report based on the work of the laboratory planning sub-committee of the Salisbury and District Science Teachers' Association. Views and recommendations on laboratory planning are given in detail. Floor plans are included.

cs 23 ----- -----
Proposed 'extended teaching schedule' based on A.E.B. A-level biology syllabus.
Jour. of A.S.E.C.A., v. 4, 1963: 82-86.

cs 24 ------ -----
Report of the sub-committee of the Salisbury and District Science Teachers' Association on Forms I and II syllabi in general science.
Fed. Sci. Teach. J., v. 3, no. 1, 1962: 95-113.

cs 25 Salisbury and District Science Teachers' Association
Report of the sub-committee on the inadequacy of science teaching in the Federation.
Fed. Sci. Teach. J., v. 2, no. 1, 1961: 56-60.
Also published in mimeographed form under the same title. Sept. 1961. 8 p.

Considers differences in salaries and allowances, promotion, recruitment of science teachers, retention of existing science teachers and how to make more effective use of existing science teachers.

Sub-committee, Joint Study Group and Panel Reports

See also: Clarke, Graham C. L. (cs 52);
Gilbert, Peter G. S. (cs 86);
Harris, D. S. (cs 104);
Noel, A. R. A. (cs 171).

cs 26 Banda, S. C. Washington
The khungu of Lake Malawi
Malawi Sci. Teach., v. 3, no. 1, Sept. 1967: 68-70.

Some observations and questions about the 'mysterious' clouds of flies found rising from Lake Malawi.

cs 27 Barnett, C. R.
Physics in the bush.
Fed. Sci. Teach. J., v. 3, no. 1, 1962: 44-46.

Observations on the development of physics teaching at Plumtree Secondary School.

cs 28 Bevis, J. H.
The teaching of science in the primary school.
N. Rhodesian Af. Ed. J., v. 3, no. 1, 1954: 26-28.
IEN, LIE, UZ

cs 29 Binns, B.
Plants and mankind.
Malawi Sci. Teach., v. 2, no. 2, [1966]: 50-54.

Discussion of the evolution of plants and their dispersal by and interaction with mankind. The following plants are among those mentioned: Nelumbo (Chinese water lily), cotton, Bougainvillea, mango, Mimosa pudica, Argemone mexicana (prickly yellow poppy), Sonchus arvensis (yellow Sowthistle), Bauhinia, H. schizopetalum (fringed Hibiscus), Erythrina, Striga.

cs 30 Black, A. A.
Mathematics and weather forecasting.
Jour. of A.S.E.C.A., v. 5, 1965: 23-32.

All weather forecasting is based on development of ways of finding practical solutions to the four fundamental equations: (1) the general equations of motion; (2) the continuity equation; (3) the thermodynamic energy equation; (4) the Boyle - Charles equation of state. The general equations of motion and the continuity equation are discussed in detail.

cs 31 These books could transform science teaching methods.
Malawi Sci. Teach., v. 3, no. 1, Sept. 1967: 76-78.

A general article on the possible influence of Nuffield science teaching.

cs 32 Boughey, A. F.
Botanical field work in the post-Certificate classes.
Proc. of S.D.S.T.A., 1957: [3-5].

Relation of field work to the Cambridge H.S.C. botany syllabus, giving some examples and briefly mentioning methodology. Field studies should set out to show how a problem should be solved. Problems should be confined to a narrow field.

cs 33 Brock, Brian J.
African primary science teachers' program.
Sci. Ed. News (Zambia), no. 1, [Mar. 1967]: 7-8.

Report of a talk on the African Primary Science Program.

cs 34 ----- -----
Electrolysis as a class experiment.
Sci. Ed. Newsletter (Zambia), no. 2, [July] 1967: 19-10.

Ideas on construction of voltameters from various materials, with suggestions for experiments to perform with them.

cs 35 ----- -----
[Letter to the editor.]
Sci. Ed. Newsletter (Zambia), no. 2, [July] 1967: 14-15.

Recommends biological work in which children do their own observation, with reference to the African Primary Science Program Teachers' Guide unit Ask the Ant Lion.

cs 36 ----- -----
Letter to the editor.
Sci. Ed. News (Zambia), no. 3, [Dec.] 1967: 12-13.

Examination of the non-luminous zone of a candle flame in daylight.

cs 37 Brown, R. H.
The teaching of VI Form physics.
Jour. of S.D.S.T.A., v. 3, no. 1, 1959: [15-18].

Who is in the sixth form; what qualities must we develop in them; how is this to be done?

cs 38 Bullington, R. A.
African education in N. Rhodesia.
Sci. Ed., v. 48, no. 4, Oct. 1964: 320-326
LIE, SwU

General survey of African education with a section dealing specifically with science in the schools.

cs 39 ----- -----
The teaching of science in the upper primary school.
N. Rhodesian Af. Ed. J., v. 7, no. 2, 1962: 9-20.
IEN, L, LC, LIE, UZ

cs 40 Capon, J. G.
Secondary school laboratories in Britain.
Fed. Sci. Teach. J., v. 2, no. 1, 1961: 29-32.

cs 41 Case, John H.
Hints and kinks.
Jour. of A.S.E.C.A., v. 5, 1965: 60-61.

An inexpensive barometer; student spectroscope; simple hydraulic demonstration apparatus.

cs 42 ----- -----
Hints and kinks.
Malawi Sci. Teach., v. 1, no. 2, Nov. 1965: 47-48.

Dinkum die; Grams iodine solution; paper mache; protecting varnish for labels; tropical fish food.

cs 43 ----- -----
Introduction to astronomy.
Jour. of A.S.E.C.A., v. 5, 1965: 16-22.

Teacher's guide to a unit on astronomy.

cs 44 ----- -----
Letter to the editor.
Malawi Sci. Teach., v. 2, no. 2, [1966]: 82-83.

Proposes the development of a handbook on 'village technology' for use by school science teachers. Examples are given.

cs 45 Case, John H.
Malawi experimental mobile laboratory program.
Malawi Sci. Teach., v. 1, no. 1, June 1965: 17-19.

A mobile laboratory (in a caravan) can provide schools with lecture demonstrations requiring preparation for which the teacher has neither time nor equipment; possibility of tours so that correspondence students may see demonstrations; the prototype mobile laboratory has provided information for improvements in subsequent models.

cs 46 ----- -----
Projected science centre and mobile science unit program.
Ministry of Education (Inspectorate) Report No. SY/6/2 with Report No. SY/6/8 appended.
Ministry of Education, Blantyre, Malawi, 1965.
typescript.

This is the culminating report on a year-and-a-half long experimental science teaching aids and mobile science unit program for the Malawi secondary schools. Contains proposals for future action.

cs 47 ----- -----
The rural production of beer and gin in Malawi.
Malawi Sci. Teach., v. 2, no. 2, [1966]: 79-81.

A step-by-step comparison of village and commercial brewing methods, followed by suggestions for individual or group study projects for secondary school pupils.

cs 48 Chalemba, Aidan
Uses of some plants on Likoma island.
Malawi Sci. Teach., v. 2, no. 2, [1966]: 62-64.

The essay which won third prize in the S.T.A.M. 1966 essay competition for secondary school pupils.

cs 49 Chapman, R. A.
Magnetism for junior forms.
Fed. Sci. Teach. J., v. 1, no. 1, 1960: 69-70.

Teaching notes put forth in a brief letter to the editor.

cs 50 Chimphamba, B. B.
Nature conservation in Malawi.
Malawi Sci. Teach., v. 3, no. 1, Sept. 1967: 73-76.

The importance of educating Malawians to husband the resources of the country, and the part which the schools can play in this education.

cs 51 Chitondo, M.
Dar es Salaam African Primary Science Program workshop 1966.
Sci. Ed. News (Zambia), no. 1, [Mar. 1967]: 8-11.

Report on the E.D.C. African Primary Science Program workshop held in Dar es Salaam, Tanzania, 6 July - 17 August 1966. This workshop was the sequel to the workshop held in Entebbe, Uganda, 5 July - 13 August 1965.

cs 52 Clarke, Graham C. L.
Sequel to A.S.E.C.A.'s report on laboratory planning.
Jour. of A.S.E.C.A., v. 5, 1965: 33-34.

cs 53 ----- -----
Summary of talk on laboratory design and construction.
Proc. of S.D.S.T.A., 1957: [10-12].

Construction and building materials for laboratory benches and accessories.

cs 54 Correspondence on the 1960 H.S.C. biology results.
Fed. Sci. Teach. J., v. 2, no. 1, 1961: 61-62.

cs 55 Cowper, R. S. W.
The sixth form at Milton school.
Fed. Sci. Teach. J., v. 1, no. 1, 1960: 34-38.

Describes the physical plant, facilities, and subjects offered for the sixth form at Milton school. The laboratory facilities are described in detail.

cs 56 Cross, L.
The training of African lab assistants in schools.
Jour. of A.S.E.C.A., v. 5, 1965: 46-49.

The duties, knowledge and abilities, general qualifications, recruitment, training and supervision of laboratory assistants for schools are considered.

cs 57 Darling, D. H.
The use of a 'nylon cutter' for heat-sealing thin polythene sheeting.
Fed. Sci. Teach. J., v. 3, no. 1, 1962: 91.

cs 58 Davies, L. H.
Technical education in the Federation.
Proc. of S.D.S.T.A., 1957: [18-23].

Some general aspects and current development at the Salisbury Polytechnic.

cs 59 Davis, J. R.
The identification of flowering plants: a list for the Malosa area.
Malawi Sci. Teach., v. 2, no. 1, Mar. 1966: 25-31.

cs 60 de Bruijn, P. F.
A.S.E.C.A.: an introduction and invitation.
Jour. of A.S.E.C.A., v. 4, 1963: 1-2.

Aims and aspirations of the Association for Science Education in Central Africa.

cs 61 Driscoll, D. R.
The principle of Le Chatelier.
Fed. Sci. Teach. J., v. 2, no. 1, 1961: 40-47.

Careless statements of Le Chatelier's principle can lead to inaccurate 'predictions'; some text-book cases are examined.

cs 62 Drury, M.
An African laboratory assistant at Arundel.
Jour. of S.D.S.T.A., v. 3, no. 1, 1959: [66].

Description of the work of a laboratory assistant in a girls' school.

cs 63 D. S. H.
A simple system for assessing science equipment in a large department.
Fed. Sci. Teach. J., v. 3, no. 1, 1962: 89.

cs 64 Durrant, J. A.
Some simple chemical experiments.
Malawi Sci. Teach., v. 2, no. 2, [1966]: 55-56.

Making snow; reaction of concentrated nitric acid with sugar; producing a 'silver' coin from a copper coin; thermit reaction; exploding soap bubbles; crystallization.

cs 65 Eccles, D. H.
The fishes of Lake Malawi.
Malawi Sci. Teach., v. 1, no. 1, June 1965: 36-44.

Lake Malawi is of intense interest to biologists because of its unique fauna. The author outlines the ecology of the lake and considers the evolutionary significance of the many closely-related species. A chart showing some feeding relationships among the fish in the lake is included.

cs 66 Edney, E. B.
Natural selection today.
Fed. Sci. Teach. J., v. 1, no. 1, 1960: 17-22.

A brief historical outline of the changes in thought of natural selection as a mechanism of evolution.

cs 67 ----- -----
Nerves, hormones and genes.
Fed. Sci. Teach. J., v. 2, no. 1, 1961: 13-24.

Considers three ways in which information is conveyed from one part of a living organism to another, or in the case of reproduction, to another organism.

cs 68 ----- -----
Selected list of books forming a nucleus of a library of Zoological and botanical references for the use of teachers and senior students in schools in the Federation.
Fed. Sci. Teach. J., v. 2, no. 1, 1961: 48-51.

cs 69 Eisler, H.
Correspondence education in the sciences and mathematics.
Malawi Sci. Teach., v. 3, no. 1, Sept. 1967: 28-31.

Discusses some problems of education by correspondence, and gives examples of two ways in which the Correspondence College attempts to compensate the solitary student.

es 70 Ellis, R. T.
Factors affecting the yield of tea in Malawi.
Malawi Sci. Teach., v. 3, no. 1, Sept. 1967: 42-47.

The influence of plant-spacing, soil nutrients, carbon dioxide availability, water, and sunshine.

cs 71 Elsworth, J. F.
Simple demonstration of Le Chatelier's principle using nitrogen dioxide.
Fed. Sci. Teach. J., v. 1, no. 1, 1960: 69.

Teaching notes put forth in a brief letter to the editor.

cs 72 English, D. R.
The difficulties experienced by the African child in learning physics.
Jour. of Ed. in New Africa, v. 1, no. 11, June 1964: 12-15.

See English, D. R. (cs 73).

cs 73 English, D. R.
The difficulties of an African child in learning physics.
Jour. of A.S.E.C.A., v. 4, 1963: 32-44.

See Malaba, T. V. for a reply. (cs 136)

An examination of the difficulties in dealing with an experimental science; difficulties which grow out of the expectations of the African student; limitations of instructional materials; and an environment which has not provided him with the manipulative and representational experiences available to European youngsters.

cs 74 Examples of Nuffield-type exam questions from O-level biology papers.
Malawi Sci. Teach., v. 2, no. 2, [1966]: 48-49.

cs 75 Exercise in reasoning.
Sci. Ed. Newsletter (Zambia), no. 2, [July] 1967: 30.

A '12 apparently-identical balls' problem.

Federal Science Teachers' Association

See Association for Science Education in Central Africa.

cs 76 Finn, Hugh L.
1984; or Locksley Hall revised.
Fed. Sci. Teach. J., v. 3, no. 1, 1962: 91.

A poem.

cs 77 Foot, D. L.
Two simple botanical studies as an aid to silviculture.
Malawi Sci. Teach., v. 2, no. 1, Mar. 1966: 12-14.

Describes briefly the work of Malawi's silviculturists, then shows how schools can do a 'flowering study' and a 'short growth study'.

cs 78 Foot, L. R. F.
Science equipment for primary schools.
N. Rhodesian Af. Ed. J., v. 6, no. 3, 1959-60: 42-48.
IEN, L, LIE, UZ

cs 79 Further problems.
Sci. Ed. News (Zambia), no. 3, [Dec.] 1967: 14.

A weighing problem puzzle.

cs 80 Gadd, K. G.
Modern techniques in medical chemistry.
Jour. of A.S.E.C.A., v. 5, 1965: 9-13.

Briefly reviews the use of colorimetry absorption measurements, electrophoresis, and chromatography in medical chemistry.

cs 81 Garley, D. L.
Science in the junior school.
Fed. Sci. Teach. J., v. 3, no. 1, 1962: 64.

A plea for communication of ideas for a new approach to junior science.

cs 82 Gilbert, Peter G. S.
Foreward.
Proc. of S.D.S.T.A., 1957: [2].

Editorial. Motives for publishing the Proc. of the S.D.S.T.A.

cs 83 ----- -----
A heuristic approach in junior science: some reflection on refraction.
Jour. of A.S.E.C.A., v. 4, 1963: 26-31.

An account of two lessons given to secondary school pupils, for observation by student teachers taking a postgraduate certificate in education.

cs 84 ----- -----
Implications for Central Africa of developments in science curriculum design.
Teach. Ed., v. 5, no. 1, May 1964: 3-12.
CUR, IEN, LC, LIE,
NCT, O, SwU

An examination of the problems of science education in Central Africa. The author urges a four-fold program of action for reforming the science curriculum; (1) reaching agreement on the establishment of a local examining authority; (2) attention to training of science teachers; (3) fundamental research and clinical testing of approaches in the schools; (4) allocating funds to handle problems of communication and the production of instructional materials. Attention is given to the work of the Association for Science Education in Central Africa.

cs 85 ----- -----
A modification of the thistle funnel demonstration of osmosis.
Proc. of S.D.S.T.A., 1957: [13].

Design and construction information.

cs 86 Gilbert, Peter G. S.
A new approach to sixth form biology.
Fed. Sci. Teach. J., v. 1, no. 1, 1960: 27-31.

A review of the report of a biology panel which is concerned with the three advanced level subjects of biology, botany, and zoology. Subcommittees of this panel considered three special aspects, viz. (1) the syllabus; (2) practical teaching and examinations; (3) examination questions.

cs 87 ----- -----
The purpose of a science education centre.
Jour. of A.S.E.C.A., v. 5, 1965: 35-38.

The writer discusses the proposed development of a science centre in the Department of Education of the University College of Rhodesia and Nyasaland.

cs 88 ----- -----
School science departments in the Federation.
Jour. of S.D.S.T.A., v. 3, no. 1, 1959: [45-53].

Summary and analysis of the replies to a questionnaire circulated to secondary schools in the Federation. Size of school; number of staff; examining body; subjects offered; weekly allocation of classes; size of S.C. and H.S.C. classes; school leavers proceeding to university; laboratories; etc.

cs 89 ----- -----
Some general observations on the Physical Science Study Committee's course (P.S.S.C.) for American high schools.
Fed. Sci. Teach. J., v. 3, no. 1, 1962: 47-63.

cs 90 Gilgut, C. J.
The Agricultural Research Council of Central Africa.
Malawi Sci. Teach., v. 3, no. 1, Sept. 1967: 49-53.

The administration of the research; a brief introduction to eleven of its projects, including research into soil productivity, animal productivity, plant diseases, pests, etc.

cs 91 Gjerde, C.
Ikeya-Seki
Malawi Sci. Teach., v. 2, no. 1, Mar. 1966: 44.

Short account, with photograph, of a comet visible near the end of 1965.

cs 92 Goslin, R. C.
The preparation and use of science apparatus and materials in upper schools.
N. Rhodesian Af. Ed. J., v. 5, no. 1, Nov. 1956: 38 +.
IEN, L, LIE, UZ

cs 93 ----- -----
Science in upper schools: Part I. Ordering materials and equipment.
N. Rhodesian Af. Ed. J., v. 4, no. 2, May 1956: 46-52.
IEN, L, LIE, UZ

cs 94 ----- -----
Selection of topics in the study of nature.
N. Rhodesian Af. Ed. J., v. 6, no. 1, 1957: 49-55.
IEN, L, LIE, UZ

cs 95 Gough, D. I.
The interior of the earth.
Fed. Sci. Teach. J., v. 1, no. 1, 1960: 3-16.

A descriptive account of modern knowledge of the structure of the earth and some of the methods used in obtaining geophysical information.

cs 96 Greenhalgh, Roy
Radio lessons.
Sci. Ed. Newsletter (Zambia), no. 2, July 1967: 9-13.

A consideration of the aims of broadcast science lessons, and the problems of realizing these aims; with reference to a series of lessons on Zambian radio.

cs 97 Greenshields, A.
A biological expedition for girls to the Chimanimani mountains in May 1959.
Jour. of S.D.S.T.A., v. 3, no. 1, 1959: [54-56].

Report of an expedition to introduce upper and lower sixth form girls to the study of ecology and flora of the Chimanimani mountains.

cs 98 Griffiths, A.
Photographic methods to examine nearly frictionless motion of a body.
Jour. of A.S.E.C.A., v. 4, 1963: 23-25.

Notes on a local implementation of part of an American physics scheme (P.S.S.C.); some problems which were encountered and their solution.

cs 99 The Guinness Awards for science and mathematics teachers in Africa.
Malawi Sci. Teach., v. 2, no. 1, Mar. 1966: 49-51.

Announcement of the purpose, and rules of the competition.

cs 100 Gunn, D. L.
The International Red Locust Control Service in the Federation.
Jour. of S.D.S.T.A., v. 2, no. 1, 1958: [8-12].

Description and history.

cs 101 Guy, G. H.
Modern museums.
Jour. of A.S.E.C.A., v. 4, 1963: 68-70.

A general account of the function of museums in society.

cs 102 Hancock, P. N.
Amateur radio.
Malawi Sci. Teach., v. 3, no. 1, Sept. 1967: 53-54.

A general account of an interesting scientific hobby.

cs 103 Hardie, John
District maize fertilizer trials.
Malawi Sci. Teach., v. 2, no. 2, [1966]: 67-71.

Relevance of maize fertilizer trials to many parts of the school syllabus, including the philosophy behind methods of setting up the experiments.

cs 104 Harris, D. S.
Part I and part II syllabuses for Cambridge H.S.C. biology.
Jour. of S.D.S.T.A., v. 3, no. 1, 1959: [31-41].

Syllabuses which attempt to put the ideas of the Cambridge Oversea H.S.C. subsidiary biology syllabus and examination sub-committee of the S.D.S.T.A. into practice.

cs 105 Houston, J. J.
The need for technical assistance in schools.
Fed. Sci. Teach. J., v. 1, no. 1, 1960: 32-33.

If practical work is to be carried out in schools, laboratory technicians and stewards are necessary. Aspects of recruitment and training are briefly mentioned.

cs 106 Huxley, J.
Some interesting experiments with laterite.
Sci. Ed. Newsletter (Zambia), no. 2, [July] 1967: 15-17.

Instructions for simple experiments using a locally-available material.

cs 107 ----- -----
The use of aluminium powder in showing convection currents in liquids.
Sci. Ed. Newsletter (Zambia), no. 2, [July] 1967: 17-19.

cs 108 James, W. S.
The shape of things to come in O-level chemistry teaching.
Jour. of A.S.E.C.A., v. 5, 1965: 39-43.

The author describes, in detail, the history, content and present status of the Nuffield O-level chemistry approach.

cs 109 Jones, J. Nelson
Some aspects of the design of a Marimba.
Fed. Sci. Teach. J., v. 1, no. 1, 1960: 23-26.

Analysis of the Marimba (or timbila) as designed and used by the Chopi people, showing a high degree of technical skill and insight into basic physical principles.

cs 110 Jubb, W. P.
Agriculture and science (an experiment at Kafue).
N. Rhodesian Af. Ed. J., v. 4, no. 2, May 1956: 53-58.
IEN, L, LIE, UZ

cs 111 Kimball, Richard L.
The science centre.
Malawi Sci. Teach., v. 3, no. 1, Sept. 1967: 38-39.

On the work being done to develop an environment-oriented primary school science course.

cs 112 Lawrence, J. A.
Letter to the editor.
Sci. Ed. News (Zambia), no. 3, [Dec.] 1967: 12.

Science curriculum projects in Tanzania; a method for showing the presence of iron in laterite.

cs 113 Lawson, Christopher G.
A system of diagrams for teaching salts.
Malawi Sci. Teach., v. 1, June 1965: 45-47.

An unusual approach to an important section of the chemistry syllabus, involving much practical work, and an interesting display on charts. Two diagrams exemplify the system used.

cs 114 A lead tree grown in a gel.
Fed. Sci. Teach. J., v. 3, no. 1, 1962: 90.

cs 115 Leclerc, P. A.
Science spots.
Malawi Sci. Teach., v. 2, no. 1, Mar. 1966: 34-35.

A scheme for helping form one pupils to become familiar with laboratory equipment and simple laboratory procedures, by a 'play as you learn' method.

cs 116 Leisten, John A.
New questions in science teaching.
Malawi Sci. Teach., v. 2, [1966]: 25-31.

Examination questions should stimulate rather than stifle science teaching. Various types of thought-provoking questions are considered.

cs 117 ----- -----
Why chemistry?
Malawi Sci. Teach., v. 2, no. 1, Mar. 1966: 16-24.

An open lecture given at the University of Malawi, showing the types of problem faced by former chemists, some of the types of contribution made to society by science and scientists, and problems of educating undergraduate science students.

cs 118 'Lepton'
The Van de Graff electrostatic generator.
Jour. of S.D.S.T.A., v. 2, no. 1, 1958: [16-18].

History and operation.

cs 119 Loveless, A. R.
The new classification of the Fungi.
Jour. of A.S.E.C.A., v. 4, 1963: 55-60.

Outlines modern reasoning behind classification of fungi as a division (Mycota) and the breakdown of this division into nine classes.

cs 120 McBurney, Sheila M.
A competition.
Malawi Sci. Teach., v. 2, no. 2, [1966]: 78.

Reprint of a competition from 'Research' (the magazine of the Mzuzu Secondary School Science Club) to stimulate further ideas for science club activities.

cs 121 ----- -----
How can rays of light cross each other?
Malawi Sci. Teach., v. 1, no. 2, Nov. 1965: 43-44.

A class 'argument' and an attempt (by use of a simple water-wave analogue) to resolve it.

cs 122 ----- -----
An introduction to electricity.
Malawi Sci. Teach., v. 2, no. 2, [1966]: 74-77.

Introducing electricity in Malawi schools is complicated by language problems; a tested introductory lesson is outlined suggesting one way round the problem.

cs 123 ----- -----
Lines of force.
Malawi Sci. Teach., v. 1, no. 2, Nov. 1965: 43-44.

A simple demonstration (with floating magnetised needles) to show the movement of a 'free North pole'.

cs 124 ----- -----
Positively and negatively charged bogeys.
Malawi Sci. Teach., v. 1, no. 2, Nov. 1965: 28-30.

An approach to teaching about ions, brought in as an explanation of the properties of acids in dilute solution; the concept is therefore already familiar to pupils before they have to tackle electrochemistry.

cs 125 ----- -----
Relating science to village life.
Malawi Sci. Teach., v. 1, no. 1, June 1965: 12-16.

Survey of 120 pupils shows that they learn more easily if school science is related to their experience; some detailed accounts and some 'quickies' give teachers examples to draw upon.

cs 126 ----- -----
Science diagrams.
Malawi Sci. Teach., v. 2, no. 1, Mar. 1966: 40-43.

Why rural pupils have trouble with section drawings, and how they may be helped. Examples of some accepted conventions and common errors are included.

cs 127 McIntyre, Elizabeth
How are your old clamps?
Malawi Sci. Teach., v. 1, no. 2, Nov. 1965: 47.

cs 128 ----- -----
Malawi and Nuffield chemistry.
Malawi Sci. Teach., v. 2, no. 2, [1966]: 34-37.

A critical consideration of the relevance of the Nuffield approach for pupils from a non-technological background.

cs 129 ----- -----
Modified Hofmann's voltameter.
Malawi Sci. Teach., v. 1, no. 1, June 1965: 51.

A cheap, but usable, voltameter constructed from a a broken light bulb, an empty polythene container, wire and solder.

cs 130 Maasdorp, L.
Another butterfly to rear in the laboratory.
Jour. of A.S.E.C.A., v. 5, 1965: 44-45.

Information on the life cycle and rearing of the African monarch (Danaus chrysippus L.).

cs 131 ----- -----, comp.
The Certificate of Secondary Education.
Jour. of A.S.E.C.A., v. 5, 1965: 50-52.

A review of the development and general make-up of the Certificate of Secondary Education examination. Based on a talk by Mr. E. Machin at the Nuffield Biology Conference held in Salisbury in September, 1965.

cs 132 ----- -----
Chairman's message.
Jour. of A.S.E.C.A., v. 5, 1965: 2-3.

Calls for a revision of responsibility allowances as one method of retaining science teachers in teaching posts.

cs 133 MacDonald, I. S.
A guide to fish pond farming.
Malawi Sci. Teach., v. 2, no. 1, Mar. 1966: 36-39.

Importance of fish in the diet; advantages and methods of fish-pond farming.

cs 134 MacDonald, P.
Rearing Hydra in the school laboratory.
Jour. of A.S.E.C.A., v. 5, 1965: 14-15.

Hints on the rearing of Hydra and Daphnia.

cs 135 Madizivanyika, J. L.
Some objectives of science teaching. Zambia Association for Science Education.
Sci. Ed. Newsletter (Zambia), no. 2, [July] 1967: 26-28.

Fifty-eight stated aims for consideration and evaluation by Z.A.S.E. members.

cs 136 Malaba, Theodora Veronica
Letter to the editor. Commenting on 'The difficulties experienced by an African child in the study of physics'.
Jour. of A.S.E.C.A., v. 5, 1965: 56-59.

See English, D. R. (cs 72, 73).

cs 137 Malawi, Minister of Education
Minister's address.
Malawi Sci. Teach., v. 2, no. 1, Mar. 1966: 10-11.
An address which was to have been given by the Minister of Education, Mr. J. D. Msonthi, at the Association conference, Dec. 1965.

Need for development of science teaching in the country, and some ways in which the Ministry is working toward this goal.

cs 138 Malawi, Ministry of Education
Biology. Junior Certificate. Year I. Teacher's Guide.
Ministry of Education, Blantyre, 1966. 57 p. mimeo.

A syllabus and notes.

cs 139 ----- -----
Education project - International Development Association.
Secondary technical education and teacher training.
Government Printer, Zomba, 1966. 202 p.
NSU

Malawi educational development project loan application to the I.D.A./I.B.R.D. Contains detailed information on the country, educational system (including technical and science education), and proposals and costing for the project.

cs 140 ----- -----
General science syllabus for Malawi secondary schools.
Ministry of Education, Blantyre, 1963. 24 p. mimeo.

cs 141 ----- -----
Junior Certificate syllabus, December, 1966.
Government Printer, Zomba, Dec. 1966. 68 p.

See particularly: Mathematics, 34-35; General Science, 36-45; Physics with Chemistry, 46-47; Biology, 48-49; Health Science, 50-51.

cs 142 Malawi, Ministry of Education
Physics with chemistry. Junior Certificate. Year I.
Homework and tests.
Ministry of Education, Blantyre, 1966. 19 p. mimeo.

cs 143 ----- -----
Physics with chemistry. Junior Certificate. Year I.
Pupil's Notes.
Ministry of Education, Blantyre, 1966. 21 p. mimeo.

cs 144 ----- -----
Physics with chemistry. Junior Certificate. Year I.
Teacher's guide.
Ministry of Education, Blantyre, 1966. 49 p. mimeo.

A syllabus and notes.

cs 145 ----- -----
Primary school syllabus. 1966.
Ministry of Education, Blantyre, 1966. 111 p.

See particularly: The Scientific Approach, 1-3; Mathematics, 26-36; Nature Study and Science, 53-65.

cs 146 Malawi's tea industry - its export markets.
Malawi Sci. Teach., v. 3, no. 1, Sept. 1967: 48-49.

Statistics, export routes, and markets.

cs 147 Margareta, Aubrey
Village science.
Malawi Sci. Teach., v. 2, no. 1, Mar. 1966: 47-48.

Details for the preparation of gin (called whiskey in the article), beer, salt and oil. The winning essay for the 1965 S.T.A.M. essay competition for secondary school pupils.

cs 148 Matinga, C. J.
Store-keeper's holiday: some comments on education in Africa.
Times Ed. Supp., 1446, 16 Jan. 1943: 28.

cs 149 Meara, A. S.
Teaching sixth form biology in the Federation.
Jour. of S.D.S.T.A., v. 3, no. 1, 1959: [19-26].

What is biology; what are the aims pursued in the teaching of sixth form biology; what is required to develop the qualities we want our students to have.

cs 150 Melling, Adrian
Comments on first draft of Teaching Notes for J.S.S.L.E. General Science Syllabus, first term, 1967. I.
Sci. Ed. Newsletter (Zambia), no. 2, [July] 1967: 21-23.

Constructive comments on a Zambian teaching scheme; useful in conjunction with the notes on the scheme.

cs 151 ----- -----
Comments on teaching notes for junior general science syllabus - 2nd term.
Sci. Ed. News (Zambia), no. 3, [Dec.] 1967: 4-8.

Detailed comments.

cs 152 Merritt, R.
The Nuffield O-level chemistry project.
Malawi Sci. Teach., v. 2, no. 2, [1966]: 38-47.

A detailed report on the Nuffield chemistry project, with consideration of its relevance for Malawi.

cs 153 Mhango, M. R. Kaluwefu
Chairman's letter.
Malawi Sci. Teach., v. 3, no. 1, Sept. 1967: 22.

On the progress of S.T.A.M. since its initiation in 1964.

cs 154 Michael, Ian
The map of knowledge.
Malawi Sci. Teach., v. 1, no. 2, Nov. 1965: 31-38.

Traditional 'labels' for subjects may not be the most meaningful; planning in the new University of Malawi should take account of the fact that its students will be leaders of groups (large or small) of men, and they therefore need some 'social sciences'. A suggested redivision of subjects is: (1) the physical universe; (2) animate nature; (3) man; (4) relations between men; (5) values asserted by men. For each of these five divisions, university courses should (a) describe what is and (b) prescribe what should be.

cs 155 ----- -----
Science in the University of Malawi.
Jour. of A.S.E.C.A., v. 5, 1965: 54-55, 64.

Reprinted from the Malawi Science Teacher, v. 1, no. 1, June 1965. (cs 156)

cs 156 Michael, Ian
Science in the University of Malawi.
Malawi Sci. Teach., v. 1, no. 1, June 1965: 48-51.

Basic science teaching; redirection; science as part of general education; research training in the undergraduate course; research; science and the public; the university and the schools.

cs 157 Mitchell, D. S.
Dryopteris anthamantica.
Jour. of A.S.E.C.A., v. 4, 1963: 66.

Short note on a fern suitable for local studies (replacing Dryopteris felix-mas).

cs 158 ----- -----
Report of incidence of Salvinia auriculata Aubl. on Lake Kariba.
Fed. Sci. Teach. J., v. 1, no. 1, 1960: 39-46.

The writer describes conditions of Salvinia infestation as observed on Lake Kariba in January 1960. An attempt is made to predict the consequence of Salvinia auriculata on the lake.

cs 159 Mkandawire, Chikoma
Use of plants in Malawi.
Malawi Sci. Teach., v. 2, no. 2, [1966]: 58-62.

The winning essay in the S.T.A.M. 1966 essay competition for secondary school pupils. Describes contemporary and traditional uses of plants in Malawi.

cs 160 Morgan, G. S.
Some impressions of science education in Polish schools.
Jour. of A.S.E.C.A., v. 4, 1963: 71-75.

Account of a visit to Poland by a group of students from the Institute of Education, University of London.

cs 161 Morin, John-Charles (Bro.)
Science teaching in England and its relevance to Nyasaland including some attention to mathematics.
Associateship Report, Institute of Education, University of London, 1959. 126 p. biblio.
LIE

cs 162 Moss, K. D.
Science 'fairs' in Victoria, Australia.
Fed. Sci. Teach. J., v. 2, no. 1, 1961: 33-35.

Competition in individual projects stimulates interest and activity among secondary school pupils.

cs 163 Moss, Stan
Some suggestions for field work in secondary schools.
Malawi Sci. Teach., v. 1, no. 1, June 1965: 20-35.

Outlines reasons for undertaking field work; suggestions for schools, in thirteen sections, including approximately sixty line drawings of local flora and fauna, many practical ideas for the laboratory, detailed suggestions for study of trees, system for identifying flowers, study of a pond, and a list of useful references for the teacher.

cs 164 Mwanza, N. Peter
The Lake Chilwa coordinated research project.
Malawi Sci. Teach., v. 3, no. 1, Sept. 1967: 71-73.

Research by a university team into the: biology of the lake; changing morphology of the Chilwa basin; people of the area; radioactivity of soils on Nchisi island; ecological study of the northwestern land area with a view to ecological control of red locust.

cs 165 ----- -----
Report on Unesco pilot project workshop on new approaches and techniques in biology teaching in Malawi.
Malawi Sci. Teach., v. 3, no. 1, Sept. 1967: 37-38.

cs 166 ----- -----
Seminar on new approaches and techniques in biology teaching in Africa.
Malawi Sci. Teach., v. 3, no. 1, Sept. 1967: 33-37.

Report on a seminar organised in Ghana by Unesco. Malawi will benefit from international cooperation and consultation.

cs 167 Newton, B. J.
Preparing for a scientific career.
Jour. of S.D.S.T.A., v. 2, no. 1, 1958: [19-20].

A student must learn discipline as well as creative thought.

cs 168 Ng'oma, A. C.
Malawian gunpowder.
Malawi Sci. Teach., v. 3, no. 1, Sept. 1967: 64.

An account of how gunpowder was made before Europeans came to Malawi.

cs 169 Noel, A. R. A.
Environment and plant structure.
Fed. Sci. Teach. J., v. 3, no. 1, 1962: 3-14.

A plea for more detailed physiological experiments bearing on relationships between the structure and environment of plants.

cs 170 ----- -----
Life cycles in the Spermatophyta.
Jour. of A.S.E.C.A., v. 4, 1963: 45-54.

An account at a level rather more advanced than sixth form, with photographs and diagrams.

cs 171 ----- -----
The provision of microscopes for schools.
Fed. Sci. Teach. J., v. 3, no. 1, 1962: 114-115.

Factors considered (and final choice) by the sub-committee of the Salisbury and District Science Teachers' Association when asked to recommend a compound and a dissecting microscope for use in schools.

cs 172 ----- -----
A valuable mountant for use in plant microscopy.
Fed. Sci. Teach. J., v. 3, no. 1, 1962: 89.

cs 173 Nuffield Foundation Science Teaching Project.
Sci. Ed. News (Zambia), no. 1, [Mar. 1967]: 15-17.

A very brief description of the Nuffield Foundation Science Teaching Project. The texts and materials for the physics, chemistry, and biology courses are mentioned.

cs 174 Nuffield science teaching project - progress report.
Jour. of A.S.E.C.A., v. 5, 1965: 53-54.

cs 175 Nyasaland, Ministry of Education and Social Development
Extract from secondary school syllabus (revised 1957), dealing with Junior Certificate.
Ministry of Education and Social Development, Zomba, June 1962.

See particularly: Mathematics, 9-10; General Science, 12-15; Biology, 15-18.

cs 176 Nyasaland Protectorate, Education Department
Primary school syllabus.
Government Printer, Zomba, 1961. 67 p.

See particularly: Nature Study and Rural Science, 35-45; Arithmetic, 21-26; Hygiene, 47-51.

cs 177 Palgrave, Keith Coates
The place of natural history clubs in schools.
Proc. of S.D.S.T.A., 1957: [14-16].

Reasoned argument for the need for natural history clubs in schools.

cs 178 ----- -----
Rearing butterflies in the laboratory - with notes on the life cycles of two local species.
Jour. of A.S.E.C.A., v. 4, 1963: 61-65.
With photographs.

cs 179 Patrick, J.
Uses for plastic bottles and old ball-point pens.
Malawi Sci. Teach., v. 3, no. 1, Sept. 1967: 64-67.

Eight uses for plastic bottles and three uses for ball-point pens; with diagrams.

cs 180 Pawek, Jean
Beginning biology.
Malawi Sci. Teach., v. 2, no. 1, Mar. 1966: 15.

A system for making biology an interesting subject right from the start, using instruction cards, of which four samples are given.

cs 181 Pawek, William
Science competitions 1967.
Malawi Sci. Teach., v. 3, no. 1, Sept. 1967: 25-26.

News of the 1966 competitions, and announcement of the topic and rules for 1967; one essay competition and one science club competition.

cs 182 Pearse, F. C.
The nature of a thunderstorm.
Jour. of A.S.E.C.A., v. 4, 1963: 3-9.

Account of the physical factors in the build-up of thunderclouds, precipitation of rain and hail, and build-up and discharge of electrical potential difference.

cs 183 Perchard, Colin W.
S.T.A.M. and the British Council.
Malawi Sci. Teach., v. 3, no. 1, Sept. 1967: 41-42.

On the cooperation between two organisations which are concerned with education in Malawi.

cs 184 Pinchin, Malcolm C.
Developments in science education in Malawi 1966/67.
Malawi Sci. Teach., v. 3, No. 1, Sept. 1967: 32-33.

Introduction of new syllabus (written by teachers in Malawi) for Forms I and II; course to prepare teachers for the new approach; Malawi's participation in the Unesco biology project; current advances in the development of the primary school curriculum.

cs 185 Population of 8 million by 1900.
Malawi Sci. Teach., v. 3, no. 1, Sept. 1967: 26-28.

Some interesting information from the 1966 population census.

cs 186 Prince Edward Astronomy Club, The
A twelve-inch reflecting telescope project.
Fed. Sci. Teach. J., v. 3, no. 1, 1962: 15-32.

cs 187 Rae, K.
Small scale organic preparations and semi-micro inorganic analysis.
Jour. of S.D.S.T.A., v. 3, no. 1, 1959: [61-65].

A general description of semi-micro chemistry, apparatus, advantages and disadvantages.

cs 188 Report of the Anglo-African-American Conference. Salisbury, S. Rhodesia, March 1963.
Teacher Ed. (London), v. 4, Nov. 1963: 93-147.
CUR, IEN, LC, LIE, NCT, O, SwU

cs 189 Richardson, M. E.
Conference on 'sixth form science'.
Jour. of S.D.S.T.A., v. 3, no. 1, 1959: [9-11].

Report of the conference.

cs 190 Robertson, C.
The teaching of nature study.
N. Rhodesian Af. Ed. J., v. 5, no. 1, Nov. 1956: 30-34.
IEN, L, LIE, UZ

cs 191 Robins, P. A.
Curare and the chemistry of the Genus Strychnos.
Fed. Sci. Teach. J., v. 2, no. 1, 1961: 3-12.

Distribution and chemical isolation of alkaloids of the strychnine family; their biological formation and significance; preparation and composition of curare poison arrows.

cs 192 Rogers, E.
Reminiscences.
Fed. Sci. Teach. J., v. 3, no. 1, 1962: 65-85.

Thirty-six years of educational work in Southern Rhodesia, including many years in the Inspectorate.

Salisbury and District Science Teachers' Association

See Association for Science Education in Central Africa.

SCIENCE CENTRE, DOMASI (MALAWI)

cs 193 Science Centre, Domasi
Chameleon. The magazine of the Science Centre, Domasi.
Science Centre, Domasi, [no. 1], n.d. 18 p. mimeo.

The Science Centre, Domasi; exciting day; watching a lesson on seeds; problem; to Chileka via Nkula Falls; what do you know about the Zomba Mental Hospital?; you can make your own shadow box; what a science teacher should do; the hidden beauties; my first flight; how to make an aquarium; experimental garden; a flight; how we made a chicken skeleton; is he superhuman?; the first unit on soil; how to make a balance; problem; why I should have nature tables in classes; my first experience in an aeroplane; my rain gauge; make your own microscope.

cs 194 ----- -----
Chameleon. The magazine of the Science Centre, Domasi.
Science Centre, Domasi, no. 2, Sept. 1967. 26 p. mimeo.

To whom it may concern; your questions on the Chameleon answered; the Science Centre in Blantyre; the status quo; Protozoa captured; you can make your own chimney kiln (*Ng'anjo*); what next is being done at the Science Centre?; is the world changing?; the wondrous light; children maintain a balance; what does the Science Centre believe?; primary school photography; the secret of the head; magnificent movements; how many of these things and ideas are found in your classroom?; my past and present impressions about a saw and a hammer; heading towards the North; Science Centre or chicken farm?; a suggested method for teaching that light travels in a straight line; can you help answer some of these questions?; 'first-handedness'; children enjoy a lesson on buds and twigs; another lesson on buds and twigs; *utawaleza* (rainbow).

cs 195 ----- -----
The fly cycle. A unit about the life of flies.
Science Centre, Domasi, n.d. 28 p. mimeo.

An African Primary Science Program teaching unit.

cs 196 Science Centre, Domasi
Making small things look bigger. A unit on microscopes.
Science Centre, Domasi, n.d. 30 p. mimeo.

An African Primary Science Program teaching unit.

cs 197 ----- -----
More microscopes. Pupils' book.
Science Centre, Domasi, n.d. 25 p. mimeo.

An African Primary Science Program teaching unit.

cs 198 ----- -----
The Science Centre, Domasi: one year later - a status report and proposal.
Science Centre, Domasi, Oct. 1967. 21 p. mimeo.

A description of the work carried on at the E.D.C. Domasi Science Centre from its inception in Sept. 1966 to the present (Sept. 1967). A proposal for future work, staffing, and finance of the Centre is included.

cs 199 ----- -----
Soils, seeds, plants. A unit on planting experimental garden one.
Science Centre, Domasi, n.d. 26 p. mimeo.

An African Primary Science Program teaching unit.

cs 200 ----- -----
Substances, mixtures and powders. A unit about how some materials are made.
Science Centre, Domasi, n.d. 17 p. mimeo.

An African Primary Science Program teaching unit.

Science, Centre, Domasi

See also Kimball, Richard L. (cs 111).

cs 201 The Science Education Centre in the University of Zambia
Sci. Ed. News (Zambia), no. 1, [Mar. 1967]: 12-14.

A resume of the new director of the Science Education Centre, Prof. E. L. Yates, is given along with a brief indication of the proposed involvement of the Centre in science education in Zambia.

SCIENCE TEACHERS' ASSOCIATION OF MALAWI

Also known as S.T.A.M.

Conferences and Meetings

cs 202 Science Teachers' Association of Malawi
Science Teachers' Association of Malawi conference 1966.
Malawi Sci. Teach., v. 2, no. 2, [1966]: 21-24.

Notes and pictures from the S.T.A.M. conference (8-11 Aug. at the University of Malawi), serving as a source of ideas for organization of science teachers' conferences.

Journal: Malawi Science Teacher

See Usher, Neil (cs 233).

Library

No entry.

News and notes

cs 203 Science Teachers' Association of Malawi
Results of S.T.A.M. 1966 competitions.
Malawi Sci. Teach., v. 2, no. 2, [1966]: 57.

Winning essays printed in this issue.

Publications and General Articles

cs 204 Science Teachers' Association of Malawi
Laboratory rules.
S.T.A.M., Jan. 1967. 1 p. mimeo.

cs 205 ----- -----
Science diagrams.
S.T.A.M., May 1967. 2 p. mimeo.

Some suggested procedures for drawing diagrams for physics, chemistry and biology. Good and bad examples are given.

Secretary/Treasurer's Reports and Chairman's Reports and Messages

See Mhango, M. R. Kaluwefu (cs 153).

Sub-committee, Joint Study Group and Panel Reports

No entry.

S.D.S.T.A.

See Association for Science Education in Central Africa.

cs 206 Shave, Roy
A chemistry summary (from elements through salt formation).
Malawi Sci. Teach., v. 1, no. 2, Nov. 1965: 18-20.

Hints for the teacher on presenting a summary which shows the relationship between the elements, their oxides, acids, bases, alkalis and salts.

cs 207 ----- -----
Diagram relationships.
Malawi Sci. Teach., v. 1, no. 2, Nov. 1965: 22-24.

Diagrams to summarise: relationships between simple physical properties (mass, density, etc.); units concerned with heat; classification of chemical substances.

cs 208 ----- -----
Equivalent weight of magnesium.
Malawi Sci. Teach., v. 1, no. 2, Nov. 1965: 40.

A simply-constructed apparatus, with detailed instructions for preparing the experiment.

cs 209 ----- -----
A flannelboard for a chemistry lesson.
Malawi Sci. Teach., v. 1, no. 2, Nov. 1965: 21-22.

Some uses of the flannelboard, including helpful diagrams involving ions.

cs 210 ----- -----
Flotation.
Malawi Sci. Teach., v. 1, no. 2, Nov. 1965: 25-27.

An adjustable hydrometer, simply constructed, and how it may be used (a) to show the principle of flotation, (b) as a hydrometer, (c) to demonstrate the Plimsoll mark. A simple cartesian diver, and five lessons which can be drawn from it.

cs 211 ----- -----
It doesn't happen (or, try again).
Malawi Sci. Teach., v. 1, no. 2, Nov. 1965: 42.

Two common errors in science teaching.

cs 212 ----- -----
'Picture' of a sound wave.
Malawi Sci. Teach., v. 1, no. 2, Nov. 1965: 44-45.

Two class experiments with tuning forks.

cs 213 Shave, Roy
Soap bubbles of hydrogen.
Malawi Sci. Teach., v. 1, no. 2, Nov. 1965: 39.

Using an apparatus easily constructed in schools.

cs 214 Siebert, P. L.
How I teach my subject - chemistry.
Fed. Sci. Teach. J., v. 3, no. 1, 1962: 39-43.

An approach to a two year course for Higher Certificate, without subsidiary subject examinations after one year.

cs 215 Siemers, A. H.
Science in primary schools.
Jour. of A.S.E.C.A., v. 4, 1963: 76-78.

What should be taught, and how, and when?

cs 216 ----- -----
The teaching of sixth form chemistry.
Jour. of S.D.S.T.A., v. 3, no. 1, 1959: [12-14].

Problems facing the young chemistry teacher.

cs 217 ----- -----
The 1965 young scientists' exhibition.
Jour. of A.S.E.C.A., v. 5, 1965: 4-8.

The criteria for judging the exhibits and descriptions of selected exhibits are given along with general background information on the first Young Scientists' Exhibition to be held in Rhodesia.

cs 218 Smith, C. D.
Agriculture or pure science?
N. Rhodesian Af. Ed. J., v. 6, no. 1, 1957: 37-39.
IEN, L, LIE, UZ

cs 219 Southgate, A. J.
Final report of assignment in Nyasaland, teacher training (biology), 1st July 1962 - 12th June 1964.
The Expert, Blantyre, 1964. 30 p. mimeo., appendices.
RCA

cs 220 Staal, Julius D. W.
The earth's sister planet Venus.
Fed. Sci. Teach. J., v. 3, no. 1, 1962: 33-38.

cs 221 ----- -----
The wonder of Jena.
Jour. of A.S.E.C.A., v. 4, 1963: 10-19.

Description of the structure and operation of the Zeiss planetarium projector at Jena, near Leipzig, Germany.

S.T.A.M.

See Science Teachers' Association of Malawi.

cs 222 Strong, Laurence E.
Some new directions for science education.
Fed. Sci. Teach. J., v. 2, no. 1, 1961: 25-28.

Report on modern trends in America.

cs 223 Swart, E. R.
Age of the Boabab tree.
Jour. of A.S.E.C.A., v. 4, 1963: 67.

Account of the application of radiocarbon dating.

cs 224 Taylor, A. R.
The development of scientific societies in Rhodesia and Nyasaland.
In Proceedings of the First Federal Science Congress, Salisbury, May 18-22, 1960.
Mardon Rhodesian Printers, Salisbury, n.d.: 23-34.

See particularly the section entitled Scientific Societies and the Schools, pages 30-32.

cs 225 Taylor, Ian D.
The air we breathe.
Malawi Sci. Teach., v. 1, no. 2, Nov. 1965: 14-17.

Outline for an introduction to science in form one, which takes into account the special problems of children from a rural background.

cs 226 ----- -----
Playing safe with hydrogen.
Malawi Sci. Teach., v. 2, no. 2, [1966]: 72-73.

Some practical advice on coping with potentially dangerous laboratory demonstrations.

cs 227 ----- -----
This and that.
Malawi Sci. Teach., v. 3, no. 1, Sept. 1967: 23-24.

A miscellany of news involving the Association, its members and benefactors.

cs 228 Taylor, Ian D.
Witchcraft or science?
Malawi Sci. Teach., v. 2, no. 2, [1966]: 65-66.

After-thoughts on the S.T.A.M. 1966 essay competition for secondary school pupils. Gives a brief analysis, with examples, of the types of thinking which the entrants illustrated. Points out some of the current problems with 'scientific' thinking in African students.

cs 229 Travers, Moss, Pinchin, and Jepson
Report from Nyasaland. Science refresher course for secondary school teachers.
Fed. Sci. Teach. J., v. 1, no. 1, 1960: 68.

cs 230 United States Information Service, Blantyre
New plastics conduct electricity.
Malawi Sci. Teach., v. 2, no. 2, [1966]: 73.

Short report of a scientific advance.

cs 231 ----- -----
Science in the next 90 years.
Malawi Sci. Teach., v. 3, no. 1, Sept. 1967: 24.

A prediction of the dates by which some major technological advances may be expected.

cs 232 Usher, Neil
A blackened surface is a better absorber of heat than a polished one.
Malawi Sci. Teach., v. 1, no. 2, Nov. 1965: 45.

A simple demonstration.

cs 233 ----- -----
Editorial and Editors notes.
Malawi Sci. Teach., v. 2, no. 2, [1966]: 18-19.

A report on the contributions made by the Science Teachers' Association of Malawi to science teaching in Malawi during 1966.

cs 234 ----- -----
Force.
Malawi Sci. Teach., v. 1, no. 1, June 1965: 52-55.

Importance of the concept of force in physics teaching; practical teaching suggestions (including local examples of forces in action) show how to make clear the idea of force as a push or a pull, force as that which alters the velocity of a body, forces of friction, and the action of gravity.

cs 235 Usher, Neil
A glass cutter for bottles and wide tubes.
Malawi Sci. Teach., v. 1, no. 2, Nov. 1965: 46.

cs 236 ----- -----
Is wrong teaching always bad teaching?
Malawi Sci. Teach., v. 2, no. 2, [1966]: 19-20.

Is there anything seriously against presenting a picture which helps to make a particular point, but which we as teachers know to be wrong and which will have to be corrected in years to come?

cs 237 ----- -----
Water is a bad conductor, but how can you prove it?
Malawi Sci. Teach., v. 1, no. 2, Nov. 1965: 41.

An unusual experiment which settled a class argument.

cs 238 Various practical aspects of science teaching: a symposium.
Jour. of S.D.S.T.A., v. 3, no. 1, 1959: [57-59].

A brief report.

cs 239 Ward, E. H.
Are text-books infallible?
Sci. Ed. News (Zambia), no. 3, [Dec.] 1967: 8-9.

The author points out errors in her own textbook, 'Senior Physics'. Comments on other errors in textbooks are requested for inclusion in a 'Critics Column' in the Science Education News (Zambia).

cs 240 Wegner, Ingeborg
Comments on the first draft of Teaching Notes for J.S.S.L.E. General Science Syllabus, First Term, 1967. II.
Sci. Ed. Newsletter (Zambia), no. 2, [July] 1967: 24-26.

Constructive comments on a Zambian teaching scheme; useful in conjunction with the notes on the scheme.

cs 241 Wenham, E. J.
The Nuffield science teaching programmes.
Malawi Sci. Teach., v. 2, no. 2, [1966]: 31-33.

A short description of the Nuffield science teaching programmes in Britain.

cs 242 Whitmore, B. G.
Newton's third law.
Malawi Sci. Teach., v. 3, no. 1, Sept. 1967: 61-64.

On the difficulty of teaching pupils how to think about isolated systems and the forces on them.

cs 243 Wright, Ian
The determination of the ratio of charge to mass of an electron.
Fed. Sci. Teach. J., v. 2, no. 1, 1961: 36-39.

The author summarises his own account of his entry to the Ninth Annual Talent Search organised by the Science Teachers' Association of Victoria, Australia.

ZAMBIA ASSOCIATION FOR SCIENCE EDUCATION

Also known as Z.A.S.E.

Conferences and Meetings

No entry.

Journal: Science Education Newsletter

cs 244 Zambia Association for Science Education
Curriculum renewal and development. The curriculum is the thing - or is it?
Sci. Ed. Newsletter (Zambia), no. 2, [July] 1967: 1-3.

Editorial comments on curriculum reform both outside and inside Zambia, and on the moves Z.A.S.E. is making to assist science teachers in Zambia.

Library

No entry.

News and Notes

cs 245 Zambia Association for Science Education
Science Education Newsletter No. 1.
Sci. Ed. News (Zambia), no. 1, [Mar. 1967]: 1-6.

What is Z.A.S.E.?; membership and organization; radio lessons; Mathematics Teachers' Association; University of Zambia; visit of Dr. Goldstein.

cs 246 ----- -----
Social and personal.
Sci. Ed. Newsletter (Zambia), no. 2, [July] 1967: 29.

Publications and general Articles

cs 247 Zambia Association for Science Education
Constitution.
Zambia Association for Science Education, [1966]. 1 p. mimeo.

cs 248 Zambia Association for Science Education
Equipment of science laboratories.
Zambia Association for Science Education, Aug. 1967. 16 p.

Equipment list, by subject, for general science. Taken from the publication 'The Equipment of Science Laboratories in West African Schools' by the Ghana Association of Science Teachers.

Secretary/Treasurer's Reports and Chairman's Reports and Messages

cs 249 Zambia Association for Science Education
Zambia Association for Science Education.
Sci. Ed. News (Zambia), no. 3, [Dec.] 1967: 2-3.

List of officers and panel conveners followed by guide lines on the relationship of Z.A.S.E. to the nation and national goals.

Sub-committee, Joint Study Group and Panel Reports

cs 250 Committee on Syllabuses and Examinations
Excerpts from teachers' comments on the Z.A.S.E. teaching notes.
Sci. Ed. Newsletter (Zambia), no. 2, [July] 1967: 7-8.

cs 251 ----- -----
The work of the syllabuses and examinations committee of Z.A.S.E. A first report.
Sci. Ed. Newsletter (Zambia), no. 2, [July] 1967: 4-6.

cs 252 Zambia Association for Science Education
First draft of Teaching Notes for J.S.S.L.E. General Science Syllabus for Second Term, 1967.
Z.A.S.E. Subcommittee on Syllabuses and Examinations, 5 Apr. 1967. 17 p. mimeo.

cs 253 ----- -----
First draft of Teaching Notes for J.S.S.L.E. General Science Syllabus for Third Term, 1967.
Z.A.S.E. Subcommittee on Syllabuses and Examinations, 22 Aug. 1967. 8 p. mimeo.

cs 254 ----- -----
First draft of Teaching Notes for J.S.S.L.E. General Science Syllabus. Topic D. Universe.
Z.A.S.E. Subcommittee on Syllabuses and Examinations, 23 Nov. 1967. 17 p. mimeo.

Sub-committee, Joint Study Group and Panel Reports

See also: Melling, Adrian (cs 150, cs 151);
Wegner, Ingeborg (cs 240).

cs 255 Zambia, Government of
A handbook for upper primary school science teachers in the Republic of Zambia.
Ministry of Education, Lusaka, 1964. 54 p.

A syllabus and teaching notes.

cs 256 Zambia, Ministry of Education
Junior secondary school leaving (Form II) examination. Syllabuses for schools.
Ministry of Education, Lusaka, Mar. 1967. 94 p.

See particularly: General Science, 43-54; Elementary Mathematics, 55-59; Mathematics, 61-66.

cs 257 Zambia, Ministry of Education and Lusaka Association of Science Teachers
Junior secondary science teaching. Report of a conference of secondary science teachers held at the University of Zambia, Lusaka, August 21st - 27th, 1966.
Ministry of Education, Zambia, n.d. 66 p.
R. Yon, comp.

Conference report with extensive appendices containing detailed and practical consideration, lesson by lesson, of a junior science scheme.

Z.A.S.E.

See Zambia Association for Science Education.

SOUTHERN AFRICA
(SCIENCE)

ss 1 Bechuanaland Protectorate, Education Department
Draft primary school syllabus 1965.
Education Department, 1965. 14 p. mimeo.

Nature study and general science syllabus, 6 p.;
Mathematics syllabus, 8 p.

ss 2 Carman, Eric H.
The new movement in the teaching of physics.
Sci. Newsletter (U.B.B.S), v. 1, no. 1, Dec. 1965: 5-7.

ss 3 Dlamini, B. N.
A challenge to all chemistry teachers on the use of sulfur and iron as an example for the distinction between a mixture and a compound.
Sci. Newsletter (U.B.L.S.), v. 1, no. 3, Oct. 1966: 1-2.

ss 4 Hancock, P. M. J.
Agricultural education in primary and secondary schools in Lesotho.
Sci. Newsletter (U.B.L.S.), v. 2, no. 2, Nov. 1967: 6-14.

The food position in Lesotho; what can be done?; the environmental approach; agriculture in primary schools; secondary schools; the economic and nutritional aspects; status and appeal; the purpose of agriculture in secondary school; towards a degree or diploma in agriculture; qualifications of primary and secondary school teachers; the secondary school syllabus; the present Junior Certificate syllabus; conclusion.

ss 5 High Commission Territories Examinations Council
Junior certificate syllabuses: Introductory science and biology.
High Commission Territories Examinations Council, Basutoland, 1963. 20 p. mimeo.
RCA

ss 6 Hutcheon, Alan T.
Excerpts from the article: School chemistry. The search for a new approach.
Sci. Newsletter (U.B.B.S.), v. 1, no. 1, Dec. 1965: 18-25.

The article originally appeared in Education in Chemistry, Sept. 1965, under the authorship of B. S. Cane.

ss 7 Listing of science journals and other publications.
Sci. Newsletter (U.B.B.S.), v. 1, no. 1, Dec. 1965: 26.

ss 8 Lugg, Donald
The approach to science: broad or specialized?
Sci. Newsletter (U.B.L.S.), v. 2, no. 1, July 1967: 3-11.

A broad course as the only approach; alternative courses - broad and specialized; the concept of general science; difficulties associated with the broad approach; references.

ss 9 ----- -----
Astronomy and geology in introductory science.
Sci. Newsletter (U.B.L.S.), v. 1, no. 3, Oct. 1966: 12-19.

ss 10 ----- -----
Some thought on aims for science teaching in Basutoland.
Sci. Newsletter (U.B.L.S.), v. 1, no. 3, Oct. 1966: 3-4.

ss 11 ----- -----
The use of experiments in science teaching.
Sci. Newsletter (U.B.L.S.), v. 1, no. 3, Oct. 1966: 8-11.

ss 12 Morgan, Denys
Equipment for science laboratories.
The Teachers' Guide to Visual Aids, Educational Literature and Current Events, No. 4, March 1963.
Institute of Education, Pius XII College, Roma, Basutoland.
59 p. mimeo. and bound in folder.

ss 13 ----- -----
Science laboratories in secondary schools.
The Teachers' Guide to Visual Aids, Educational Literature and Current Events, No. 3, June 1962.
Institute of Education, Pius XII College, Roma, Basutoland.
40 p. mimeo. and bound in folder.

ss 14 ----- -----
A science syllabus for teacher training colleges.
The Teachers' Guide to Visual Aids, Educational Literature and Current Events, No. 4, March 1963.
Institute of Education, Pius XII College, Roma, Basutoland.
27 p. mimeo. and bound in folder.

ss 15 Shochot, John
The nuclear power station.
Sci. Newsletter (U.B.L.S.), v. 2, no. 2, Nov. 1967: 4-6.

An elementary description of how a reactor in a nuclear power station works.

ss 16 Sililo, A. T.
Elementary science.
Swaziland Teach. J., no. 54, Feb. 1967: 35-37.
LIE

ss 17 Thelejane, T. Sohl
Butterflies.
Sci. Newsletter (U.B.B.S.), v. 1, no. 1, Dec. 1965: 9-17.

A unit developed at the African Science Workshop held in Entebbe, Uganda, 1965. Attended by T. Sohl Thelejane.

ss 18 ----- -----
The challenge of teaching elementary science.
Sci. Newsletter (U.B.B.S.), v. 1, no. 1, Dec. 1965: 7-8.

ss 19 Turner, John D.
The future of science teaching.
Sci. Newsletter (U.B.B.S.), v. 1, no. 1, Dec. 1965: 1-3.

ss 20 van Praagh, Gordon
A simple chemistry kit.
Sci. Newsletter (U.B.L.S.), v. 1, no. 3, Oct. 1966: 12-19.

ss 21 Waagen, Burton S.
Progress through teamwork: an editorial.
Sci. Newsletter (U.B.B.S.), v. 1, no. 1, Dec. 1965: 3-4.

ss 22 ----- -----
The teaching of science.
Sci. Newsletter (U.B.L.S.), v. 2, no. 1, July 1967: 1-2.

All points of view need to be presented when any syllabus in any subject is being revised. Editorial in nature.

WESTERN AFRICA
(SCIENCE)

ws 1 Adegebite, Joseph Adejmobi
Science education and developmental tasks of Nigerian youth.
Thesis (Ph.D.), Columbia University, Aug. 11, 1953.
NC

A study of the developmental tasks that the youths of Nigeria need to deal with as they seek to prepare themselves for adult life in a changing culture. The study was also designed to furnish educators with some indications of what should constitute, for the country, and at the present, a sound program of general education for the secondary school.

ws 2 Adewdaa, K.
The School Certificate physics examination. Address to the G.A.S.T. refresher course Easter 1963.
G.A.S.T. Bull., v. 5, no. 2, Oct. 1963: 11-14.

An account of how the physics examination is set and marked. Advice about marking enables teachers to prepare candidates more effectively.

ws 3 Akak, A. O.
Aids to practical rural science for schools and colleges.
Adadia(?) Printing Press, Calibar, Nigeria, 1962. 67 p.

ws 4 Akisanya, A.
Modernizing the A-level chemistry syllabus.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 27-29.

ws 5 Aribisala, T. S. B.
Agriculture in the 6-year development plan.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 24-27.

ws 6 Atiase, K.
An approach to nature study.
Ghana Teach. J., v. 26, no. 2, Apr. 1960: 34-39.

ws 7 Awokoya, S. Oluwole
The role of science men in an emergent nation. Presidential address.
Jour. of S.T.A.N., v. 5, no. 3, Oct. 1966: 8-10.

The diagnostic features of the man of science; the problems of an emergent nation; the role that men of science must play.

ws 8 Awuku, K. A.
Science in training colleges.
G.A.S.T. Bull., v. 6, no. 2, Oct. 1965: 38-39.

Training college sub-committee of G.A.S.T. selected a secondary school course for the first two years of training college science, followed by additional topics in the remaining two years.

ws 9 Ayivor, V. F. K.
Science curriculum for middle schools.
G.A.S.T. Bull., v. 7, no. 1, Apr./July 1966: 27-30.

ws 10 Balogun, T. A.
Are scientific propositions synthetic or analytic?
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 43-46.

ws 11 ----- -----
Cytology and plant taxonomy.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 46-48.

ws 12 Banful, J.
Some methods of teaching elementary science that I have observed.
Ghana Teach. J., v. 25, no. 1, Jan. 1960: 31-35.

ws 13 Bartels, F. L.
Presidential address.
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 14-23.

The importance, in developing nations, of selecting pupils in order to give them the highest scientific education they can manage; the value of science and mathematics in promoting confidence through achievement; the role of teachers' associations in advising on selection, in development of courses to cater for specialists and non-specialists and in reaching the whole community with science; the contribution made by sciences in a balanced education.

ws 14 ----- -----
Presidential address given to the Ghana Association of Science Teachers. April 1961.
In G.A.S.T. 1955-1965: Addresses Given at the Tenth Annual Conference. 1965.
Kwame Nkrumah Press, Kumasi, 1965: 18-24.

See: Bartels, F. L. (ws 13);
Ghana Association of Science Teachers (ws 94).

ws 15 Bassey, E. E.
Nigerian experience.
Paper read at the plenary session of the Commonwealth Conference on the Teaching of Science in Schools, University of Ceylon, Peradeniya, Ceylon, 9 Dec. to 21 Dec. 1963.

See Commonwealth Conference on the Teaching of Science in Schools. 1963. (g 10)

ws 16 Bassey, Michael
A field review of O-level chemistry textbooks.
G.A.S.T. Bull., v. 4, no. 1, Apr. 1962: 24-28.

After rejecting out-of-date books and those which do not consider the 'scientific method', the author reviews six books which remain, selecting two as the 'best buy'. He appends some 'rules' to guide authors (and buyers) of school chemistry books.

ws 17 Beatrice, Sister
The teaching of nature study.
Ghana Teach. J., v. 19, no. 3, July 1958: 26-35.

ws 18 Benzie, H. R. H.
Consultative Council of Teachers' Associations. Secretary's report 1962.
G.A.S.T. Bull., v. 5, no. 2, Oct. 1963: 9-10.

The Council's activities (including a conference for 'new' teachers); annual conference; syllabus revision.

ws 19 Bevan, C. W. L.
Inaugural address to the Science Masters' Association of Nigeria.
West Af. J. of Ed., v. 3, no. 2, June 1959: 57-60.

The impact of science on technological advance, and its relationship with human values are taken as a background to the priorities in science teaching and the role of the Science Masters' Association.

ws 20 Bortei-Doku, S.
Science comes to our elementary schools - I.
Ghana Teach. J., v. 44, no. 4, Oct. 1964: 20-24.

Reasons for introducing science into elementary schools; problems mainly centre on training (or retraining) teachers.

ws 21 Bowden, B. V.
Universities and technical education in Ghana.
Oversea Quarterly, v. 2, no. 2, June 1960: 40-42.
CLU, E, IEN, L, LC,
LIE, NN, NC

ws 22 Britwhistle, N. A.
The rearing and collecting of insects in schools.
Nigerian Teach., v. 2, no. 6, 1936: 17.

Gives details on the construction of a suitable box for the keeping of insects.

ws 23 Carpenter, A. J.
Notes on experiments in plant physiology.
Nigerian Teach., no. 7, June 1936: 28-29.

ws 24 ----- -----
Plants for the school garden.
Nigerian Teach., v. 1, no. 4, 1935: 6-7.

Biology teachers need specimens to be handy; 39 suitable plants, with local names, methods of cultivation, and notes on their relevance to the syllabus are given.

ws 25 Carpenter, A. J. and others
Nature notes.
Nigerian Teach., no. 7, June 1936: 25-26.

A Bulbul's nest; two large animals; a Sea Hare; a lizard with two tails; slugs; a great flock of sea birds.

ws 26 Carson, R. Annan
An ecological survey of a pond near Cape Coast.
West Af. J. of Ed., v. 2, no. 2, June 1958: 49-51.

The method and results of the survey are given.

ws 27 Chadwick, B. T.
The Nuffield A-level biology scheme.
Jour. of S.T.A.N., v. 6, no. 2, Aug. 1967: 20-21.

Gives a 'skeleton' of the A-level course, with more detail on one section as an example. Mentions the current state of development of the scheme (for which materials should be published in 1969) and invites teachers to partake in afternoon workshops to assess the relevance of the trial units in Nigeria.

ws 28 ----- -----
Report of the conference secretary.
Jour. of S.T.A.N., v. 5, no. 4, Dec. 1966: 8-9.

Attendance and accomodation; registration; schedule for the S.T.A.N. conference in August 1966.

ws 29 Chadwick, B. T. and H. J. Killick
Some mathematical and scientific projects in Britain.
Jour. of S.T.A.N., v. 6, no. 1, May 1967: 8-10.

A review of current projects, giving the age groups to which they apply, their organisers and publications. General publications on modern approaches are also given.

ws 30 Champagne, D. W. and M. A. Saltman
Science curricula and the needs of Africa.
West Af. J. of Ed., v. 8, no. 3, Oct. 1964: 148-150.

Outlines the approach of P.S.S.C. (Physical Science Study Committee) course now being used in the U.S.A.; advocates its use (with its counterparts in chemistry and biology) in Africa.

ws 31 Chaplin, Basil H. G.
Elementary science: a revised approach.
West Af. J. of Ed., v. 2, no. 2, June 1958: 68-72.

Elementary science is not a grouping of sciences but a unified subject, essentially practical and related to real life, typified by the approach rather than the subject matter.

ws 32 ----- -----
Investigation and experience of curriculum planning for science education in Ghana.
Teach. Ed., v. 3, no. 3, Feb. 1963: 204-210.
CUR, IEN, LC, LIE, NCT, O, SwU

The author indicates a change in science teaching in Ghanaian schools from the learning of information to practical experiments and discovery in order to encourage the maximum amount of pupil understanding.

ws 33 ----- -----
Methods of research and curriculum development in pre-secondary education - part II.
G.A.S.T. Bull., v. 5, no. 1, Apr. 1963: 22-28.

A reminder of the criteria governing selection of topics to be studied is followed by an example of the way in which the Research Unit develops topics and lesson units; including the testing of experiments and the devising and testing of teachers' handbooks.

ws 34 ----- -----
The re-planning of junior science education in West Africa.
Sci. Ed., v. 48, Oct. 1964: 366-370.
LIE, SwU

Traditional methods stifle creative thinking; problems of the development of a new approach, especially introducing new ideas and techniques for teachers.

ws 35 Chaplin, Basil H. G.
Research and curriculum development in pre-secondary education in Ghana - part I.
G.A.S.T. Bull., v. 4, no 2, Oct. 1962: 40-48.

Extensive notes on the results of research into problems faced in science curriculum development which was carried out over an extended period. Details of the research are not included.

ws 36 ----- -----
Science education in Ghana.
Oversea Ed., v. 34, no. 4, Jan. 1963: 147-153.
LC, LIE

General account (with one detailed example) of the principles behind and the testing of science curriculum in pre-secondary schools.

ws 37 ----- -----
Teaching science in Ghana - II.
Ghana Teach. J., v. 34, no. 2, Apr. 1962: 19-25.

See Chaplin, J. (ws 38).

Practical aspects of applying to Ghanaian schools the results of the research described in Teaching Science in Ghana - I.

ws 38 Chaplin, J.
Teaching science in Ghana - I.
Ghana Teach. J., v. 33, no. 1, Jan. 1962: 38-42.

See Chaplin, Basil H. G. (ws 37).

Account of research into the effect of schooling on Ghanaian children's interpretation of scientific happenings and of comparison between 9 year old Ghanaian and American children.

ws 39 Ciparick, J. D.
Another reply to M. G. McFarlane's article.
Jour. of S.T.A.N., v. 6, no. 2, Aug. 1967: 40-42.

See McFarlane, M. G. (ws 181).

Fundamentalism is pointed out as a 'disease' affecting not only religionists but also evolutionists. A philosophical approach to various ways of expressing 'truth' is adopted.

ws 40 Clarke, J. D.
Disciples of Hygeia.
Nigerian Teach., v. 1, no. 5, 1935: 20-21.

Examination papers reveal pupils' misunderstandings in hygiene and health science.

ws 41 Coleman, Kathleen
Science in the primary school.
Ghana Teach. J., v. 45, no. 1, Jan. 1965: 46-50, v. 46, no. 2, Apr. 1965: 10-13; v. 47, no. 3, July 1965: 16-19; v. 48, no. 4, Oct. 1965: 1-5; v. 49, no. 1, Jan. 1966: ; v. 50, no. 2, Apr. 1966: 23-27; v. 51, no. 3, July 1966: 1-5; v. 52, no. 4, Oct. 1966: 21-25.

A series of articles on the teaching of science in primary school. Originally used as a broadcast script.

ws 42 Committee on Junior Secondary Schools
Syllabuses of pre-vocational subjects for Forms I-II and technically biased III of comprehensive or junior secondary schools.
Government Printer, Ibadan, 1965. 38 p.
Prepared under the sponsorship of the Ford Foundation office, Lagos.
RCA

ws 43 Common faults in science teaching in Ghana.
G.A.S.T. Bull., v. 7, no. 1, Apr./July 1966: 37.

ws 44 Davis, Peter M. H.
The mounting of butterflies on card.
Jour. of S.T.A.N., v. 5, no. 3, Oct. 1966: 40-41.

Catching; temporary storage; mounting.

ws 45 Deakin, J.
Changes in examinations for West African secondary schools.
West Af. J. of Ed., v. 8, no. 2, June 1964: 71-78.

Role of the examining body; consultative machinery; scheme and standards of examinations; syllabus review; examining techniques; catering for diversified forms of education; Higher School Certificate, its present patterns, syllabus revision, special examination for West Africa; selection process.

ws 46 Dibble, L. G.
The teaching of nature study.
Nigerian Teach., no. 9, Apr. 1951: 14-16.

Nature study as a study of the pupils' environment.

ws 47 ----- -----
The teaching of nature study.
Nigerian Teach., no. 11, Sept. 1951: 16-18.

Suggestions for practical methods, using local examples, with extracts from pupils' notes.

ws 48 Divine, V. J.
A comparative study of rural education in the United Kingdom and **Ireland** with particular reference to the teaching of rural science, and with suggestions for the teaching of that subject in primary schools and teacher training colleges in West Cameroon.
Associateship Report, Institute of Education, University of London, July 1963. 193 p. appendices, tables.
LIE

ws 49 Dowuona-Hammond, A. J.
After-dinner speech by the Hon. A. J. Dowuona-Hammond, Minister of Education, to the joint heads of secondary schools on Saturday, 8th April, 1961.
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 23-26.

Mentions the progress in implementing the second development plan; discusses problems of staffing and some aspects of administration, and asks the Association to make recommendations on these points.

ws 50 Duckworth, E. H.
The adventure of nature study.
Nigerian Teach., v. 2, no. 6, 1936: 58-59.

Pupils' nature diaries - examples of the types of questions teachers might ask in order to direct the childs' attention from his simple notes to more advanced study.

ws 51 ----- -----
How to make 9 useful objects out of an empty soda-water or beer bottle.
Nigerian Teach., v. 1, no. 5, 1935: 51-53.

ws 52 ----- -----
Nature notes.
Nigerian Teach., no. 8, Sept. 1936: 35-36.

ws 53 ----- -----
Science apparatus making in Nigeria.
Oversea Ed., v. 12, no. 2, Jan. 1941: 52-59.
COL, LC, LIE

Useful science equipment can be salvaged from many sources; ideas for construction of economical apparatus and demonstration models.

ws 54 Duckworth, E. H. and others
Nature notes.
Nigerian Teach., v. 2, no. 6, 1936: 52-56.

Monitor lizard; worm casts; Hibiscus develop prop roots; Azolla, a floating fern; 14 inch earth worm; turtles on Victoria beach; luminous sand; musical sand; abrasive action of sand; Gloriosa Superba lily; crocodiles; N. African chanting goshawk; grass-snake carrying a toad; an abnormality.

ws 55 Ducanson, W. E.
Presidential address to the 1959 annual conference of the Ghana Association of Science Teachers.
West Af. J. of Ed., v. 3, no. 3, Oct. 1959: 100-101.

A discourse on general problems of curriculum development (specialization versus liberal education) in America and other countries.

ws 56 Dunn, Ruth
Science in the grammar school curriculum.
West Af. Rev., Annual Ed. Survey, Aug. 1960.
LIE

ws 57 Egbe, P. A. I.
A biological approach.
Nigerian Teach., no. 13, Apr. 1952: 23-26.

The need for relating biology to real life, with practical suggestions as to how it may be done, and what might be achieved.

ws 58 Eldridge, D.
The application of P.S.S.C. material in Nigeria.
West Af. J. of Ed., v. 9, no. 1, Feb. 1965: 23-25.

A presentation of possible applications of material developed by the Physical Science Study Committee for Sixth Form in Nigeria. The article emphasizes how P.S.S.C. practical work develops technique in handling instruments and in understanding theory.

ws 59 Elgood, John
Secondary school biology in West Africa.
West Af. J. of Ed., v. 1, no. 1, Feb. 1957: 24-28.

Solutions to many problems in developing countries are more easily found and implemented if knowledge of biology becomes widespread.

ws 60 Engels, C. J.
How to live with uncertainty (in measurement).
Jour. of S.T.A.N., v. 6, no. 2, Aug. 1967: 18-19.

On the teaching of 'significant figures' both in reading instruments and assessing the accuracy of calculated answers.

ws 61 Essien, E. N.
A report of the comparative study of the teaching of rural science in Nigeria, Britain, and Holland.
Associateship Report, Institute of Education, University of London, June 1963. 132 p. appendices, tables, biblio.
LIE

ws 62 Etuk, M. J.
The application of elementary vector algebra to the teaching of some topics in school physics.
Jour. of S.T.A.N., v. 5, no. 2, May 1966: 4-6.

ws 63 ----- -----
Report on the technical education advisory committee.
Jour. of S.T.A.N., v. 5, no. 3, Oct. 1966: 33.

Composition of the committee and a brief report on the first meeting.

ws 64 Ewer, D. W.
Presidential address to the Ghana Association of Science Teachers. April 1965.
In G.A.S.T. 1955-1965: Addresses Given at the Tenth Annual Conference. 1965.
Kwame Nkrumah Press, Kumasi, 1965: 5-12.

See Ghana Association of Science Teachers (ws 94).

A lengthy discussion on the relation of the science syllabus and science teaching to the requirements of the nation and nation building.

ws 65 Fafunwa, A. Babs
The teaching of science in primary schools.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 14-16.

ws 66 Fafunwa, A. Babs and Mike Savage
Elementary Science Workshop, Nsukka.
Elementary Science Workshop, Nsukka, n.d. 27 p.

Brief report of the work of the Elementary Science Workshop at the University of Nigeria, Nsukka.

ws 67 Film strips available from Ghana Information Service.
G.A.S.T. Bull., v. 2, no. 1, June 1960: 34-35.

A list.

ws 68 Findlay, Ivan
The teaching of science in the primary school.
Jour. of Ed. (Sierra Leone), v. 1, no. 2, Oct. 1966: 17-22.
LIE

Problems of initiating a science scheme in primary school; how to teach methods of generalisation and scientific thought; only science should be taught in primary schools.

ws 69 Folson, J. H. K.
The development of higher education in Ghana.
G.A.S.T. Bull., v. 6, no. 2, Oct. 1965: 24-34.

A review of the needs, plans and prospects for higher education in Ghana, viewed against the historical background of development of education in the country and emphasising the importance of science based careers (such as medicine and engineering) in a developing country.

ws 70 Forge, K. B.
Weather observations.
Nigerian Teach., v. 1, no. 4, 1935: 42-43.

ws 71 Foster, G. A.
Nature study at the Hope-Waddell Institute Practicing School.
Nigerian Teach., v. 2, no. 6, 1936: 57-58.

An account, with a sample from a pupil's notebook.

G.A.S.T.

See Ghana Association of Science Teachers.

ws 72 General science syllabus for middle schools, classes I-IV.
West Africa Pamphlet, No. 304, 1935.
COL

GHANA ASSOCIATION OF SCIENCE TEACHERS

Also known as G.A.S.T.

Conferences and Meetings

ws 73 Ghana Association of Science Teachers
Annual conference. Kumasi 1959.
G.A.S.T. Bull., Dec. 1959 (insert)

Photographs.

ws 74 ----- -----
Report of the annual conference 1959 ...
G.A.S.T. Bull., June 1959: 2-21.

Summary of the address by Dr. W. E. Duncanson (secondary education, technical education, the position in Ghana); report of the buildings and equipment sub-committee; address by Mr. E. Williamson (architecture of school laboratories); an apparatus list for science laboratories in West African schools; a school science exhibition; Secretary-Treasurer's report; Cape Coast group report; sub-committee reports; election of officers; original work in science by senior pupils; scientific inquiry in schools; notes on science subjects in school examinations in Ghana and Sierra Leone 1959-1962; science and what we are trying to achieve (address by Mr. F. L. Bartels).

ws 75 Ghana Association of Science Teachers
Report of the annual conference 1960 ...
G.A.S.T. Bull., v. 2, no. 1, June 1960: 2-21.

A detailed report of the conference and the work of the Association over the previous year.

ws 76 ----- -----
Report of the annual conference 1961 ...
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 9-11.

A four day conference, at the University College, Legon, involving addresses by guest speakers, reports of various activities of G.A.S.T., displays of apparatus, experiments and books, and some sessions with members of other associations who were in conference at the same time.

ws 77 ----- -----
Report of the physics refresher course 1961.
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 31-32.

A three day course at the University College, Legon, to acquaint teachers with recent developments in physics and to explore up-to-date methods of physics teaching; all considered with a Ghanaian orientation.

Conferences and Meetings

See also: Ghana Association of Science Teachers. News and Notes (ws 80, ws 87, ws 89);
Ghana Association of Science Teachers. Publications and General Articles (ws 94);
Haggis, Sheila M. (ws 123, ws 129, ws 131, ws 132);
Schweibert, Mr. and Mrs. (ws 250).

Journal: G.A.S.T. Bulletin

See: Gray, Thomas (ws 115);
Lamptey, J. Kwesi (ws 173).

Library

ws 78 Ghana Association of Science Teachers
G.A.S.T. library.
G.A.S.T. Bull., v. 5, no. 1, Apr. 1963: 39-44.

A list of the G.A.S.T. library holdings.

ws 79 ----- -----
Ghana Association of Science Teachers library.
G.A.S.T. Bull., June 1959: 25.

A note.

Library

See also Godwin, C. (ws 113).

News and Notes

ws 80 Ghana Association of Science Teachers
The annual conference 1960.
G.A.S.T. Bull., Dec. 1959: 16.

A note.

ws 81 ----- -----
Chemistry refresher course.
G.A.S.T. Bull., Dec. 1959: 16.

A note on a coming course.

ws 82 ----- -----
The essay competition.
G.A.S.T. Bull., June 1959: 27.

Prizes are offered for a science essay and a research essay.

ws 83 ----- -----
The Ghana Association of Science Teachers essay competition 1959.
G.A.S.T. Bull., Dec. 1959: 28-29.

Prizes are offered for a science essay and a research essay.

ws 84 ----- -----
The Ghana Association of Science Teachers essay competition 1960-61.
G.A.S.T. Bull., v. 2, no. 2, Dec. 1960: 26.

Rules and conditions for entries by school pupils, for two essays - a sixth form research essay and a science essay.

ws 85 ----- -----
News and notes.
G.A.S.T. Bull., v. 4, no. 2, Oct. 1962: 52-53.

A-level chemistry; 8 mm concept films for science teaching; a plastic bag for Archimedes.

ws 86 Ghana Association of Science Teachers
News and notes.
G.A.S.T. Bull., v. 6, no. 2, Oct. 1965: 8-15.

National council for pre-university education; new teachers conference; practical physics at O-level; Britain: Association for Science Education; objective (standardized) tests in O-level G.C.E.; lectures and demonstrations by G.A.S.T. members; University College bookshop; West African Examinations Council A-level syllabus revision; summary of G.A.S.T. thinking on the need to introduce a new course in mathematics and physics at A-level; the training of laboratory technicians; statistical survey of science education in Ghana; the placing of A-level scientists; school science II; to A-level.

ws 87 ----- -----
News and notes.
G.A.S.T. Bull., v. 7, no. 1, Apr./July 1966: 10-19.

Secretary/Treasurer's report 1965-66; courses for teachers; difficulties in obtaining equipment; Nigerian Science Teachers' Association; A-level syllabus revision; sixth form science courses - the place of mathematics; Ghana Association of Science Teachers annual conference - Kumasi 1966.

ws 88 ----- -----
Notes and correspondence.
G.A.S.T. Bull., v. 2, no. 2, Dec. 1960: 27-28.

The new unit of atomic weight; International Congress of Biophysics, Stockholm, 1961; West African Science Association Conference, Ibadan, 1960; the chemical synthesis of chlorophyll A.

ws 89 ----- -----
Notes and correspondence.
G.A.S.T. Bull., v. 3, no. 1, Mar. 1961: 25-29.

Sixth forms biology conference; the angle-poise lamp - a biology aid; report on the inter-college camps vacation course in present day mathematics and physics; Heron and Cattle Egret biology; the advancement of science; nerves, brains and man.

ws 90 ----- -----
Publications of the National Science Teachers Association of U.S.A.
G.A.S.T. Bull., Dec. 1959: 17.

Copies of some of the publications are available to members.

ws 91 Ghana Association of Science Teachers
Scientific crossword.
G.A.S.T. Bull., June 1959: 26.

A competition.

ws 92 ----- -----
Scientific crossword.
G.A.S.T. Bull., Dec. 1959: 27.

A competition.

News and Notes

See also: Gray, Thomas (ws 116);
Haggis, Sheila M. (ws 121);
Moodley, G. S. (ws 185);
Morgan, Denys (ws 195);
Welch, A. J. (ws 310).

Publications and General Articles

ws 93 Ghana Association of Science Teachers
The equipment of science laboratories in West African schools.
Ghana Association of Science Teachers, Jan. 1961. 16 p.
LIE, RCA

ws 94 ----- -----
Ghana Association of Science Teachers. 1955-1965: Addresses given at the tenth annual conference. 1965.
Kwame Nkrumah Press, Kumasi, 1965. 24 p.
ASE

See also: Bartels, F. L. (ws 14);
Ewer, D. W. (ws 64);
Haggis, Sheila M. (ws 133).

ws 95 ----- -----
The planning and equipment of advanced level science laboratories in African schools.
Ghana Association of Science Teachers, Feb. 1963. 43 p.
illus.

This booklet is the third of a series on the planning and equipment of science laboratories in West African schools and is complementary to the other booklets in the series. The material for the booklet was drawn up by the biology, chemistry and physics panels of the Association.

ws 96 ----- -----
The planning of science laboratories in West African schools.
Ghana Association of Science Teachers, Jan. 1960. 16 p.
illus.
CLU, LIE

This booklet was prepared by the buildings and equipment sub-committee of G.A.S.T. to meet the needs of the rapidly developing secondary institutions in West Africa, especially those receiving grants under the second development plan.

Publications and General Articles

See also Haggis, Sheila M. (ws 122).

Secretary/Treasurer's Reports and Chairman's Reports and Messages

ws 97 Ghana Association of Science Teachers
G.A.S.T. membership list.
G.A.S.T. Bull., v. 2, no. 2, Dec. 1960: 29.

ws 98 ----- -----
G.A.S.T. membership list.
G.A.S.T. Bull., v. 3, no. 1, Mar. 1961: 29-31.

ws 99 ----- -----
The Ghana Association of Science Teachers.
G.A.S.T. Bull., June 1959: 30-31.

List of officers, members of sub-committees, regulations for membership.

ws 100 ----- -----
The Ghana Association of Science Teachers.
G.A.S.T. Bull., Dec. 1959: 1-3.

List of officers, convenors of sub-committees, members of the Association.

ws 101 ----- -----
List of new members joining in 1962.
G.A.S.T. Bull., v. 5, no. 1, Apr. 1963: 46-47.

ws 102 ----- -----
Secretary-Treasurer's report 1961-62.
G.A.S.T. Bull., v. 4, no. 2, Oct. 1962: 12-15.

Finance; membership; Bulletin; subject panels; sub-committees; local branches; Joint Consultative Council of Teachers' Associations; reciprocal membership with G.S.A.; Sixth Form Chemistry Conference; refresher course; essay competition; further publications.

ws 103 ----- -----
Secretary-Treasurer's report 1964-65.
G.A.S.T. Bull., v. 6, no. 2, Oct. 1965: 15-17.

Finance; activities; audio-visual aids advisory committee; Guinness Awards.

Secretary/Treasurer's Reports and Chairman's Reports and Messages

See also: Bartels, F. L. (ws 13, ws 14);
Duncanson, W. E. (ws 55);
Ewer, D. W. (ws 64);
Ghana Association of Science Teachers. Conferences and Meetings. (ws 74);
Ghana Association of Science Teachers. News and Notes. (ws 87);
Haggis, Sheila M. (ws 124, ws 130).

Sub-Committee, Joint Study Group and Panel Reports

ws 104 Ghana Association of Science Teachers
The building and equipment of science laboratories.
G.A.S.T. Bull., Dec. 1959: 29-30.

The building and equipment sub-committee of G.A.S.T. is preparing pamphlets on laboratories and laboratory equipment. References are given relating to the above.

ws 105 ----- -----
Junior school curriculum - study group.
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 45-46.

Short notes on five problems.

ws 106 ----- -----
Laboratory assistants in secondary institutions.
G.A.S.T. Bull., v. 3, no. 1, Mar. 1961: 9-19.

A report and memorandum on the status and conditions of service of laboratory assistants in secondary institutions, together with a scheme of training and examining of such assistants in Ghana.

ws 107 ----- -----
Recommendations of joint study groups: science for the arts student and general paper.
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 45.

ws 108 ----- -----
Report of the study group on the teaching of science in primary and middle schools.
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 44.

Proposals for courses in training colleges and for science centers in larger towns.

ws 109 Ghana Association of Science Teachers
The school science curriculum.
G.A.S.T. Bull., v. 5, no. 1, Apr. 1963: 51-57.

An account of the formation of a policy committee and its composition; aims of science teaching in Ghana, and general recommendations.

ws 110 ----- -----
Syllabus draft for 2-year introductory science course.
G.A.S.T. Bull., v. 5, no. 1, Apr. 1963: 13-21.

Introduction explains the intentions of the syllabus; syllabus is outlined, with short notes; topic approach is advocated under the headings: water, air, the sun, universe, life, force and energy.

Sub-committee, Joint Study Group and Panel Reports

See also: Awuku, K. A. (ws 8);
Haggis, Sheila M. (ws 127);
Hall, J. B. (ws 135, ws 138 - ws 142);
Morgan, Denys (ws 197, ws 198);
Stephens, D. A. (ws 286);
Welch, A. J. (ws 311 - ws 314).

ws 111 Ghana Institute of Science Education
Primary school science policy. Some views and comments.
The Institute, Kwame Nkrumah University of Science and Technology, Kumasi, Occasional Paper No. 3, 1964. 15 p.
RCA

ws 112 Ghana, University of
Department of chemistry recommended texts.
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 55-56.

List of texts for use by chemistry students in the University. Graded by level.

ws 113 Godwin, C.
G.A.S.T. library.
G.A.S.T. Bull., Dec. 1959: 17-19.

Regulations and procedures for circulation of materials by mail.

ws 114 Graham, C.
Correlation of weather records and other statistics used in teaching.
Nigerian Teach., v. 2, no. 6, 1936: 48-49.

Some suggestions; two charts are given as examples.

ws 115 Gray, Thomas
G.A.S.T. programme for work and happiness. Editorial.
G.A.S.T. Bull., v. 4, no. 2, Oct. 1962: 9-11.

Editorial on the reduction of the basic secondary school course from five years to four years and on the practical teaching of science.

ws 116 ----- -----
Kumasi branch report.
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 38.

ws 117 ----- -----
Observations on the interspecific relationship of some freshwater fishes.
G.A.S.T. Bull., v. 4, no. 1, Apr. 1962: 13-15.

ws 118 Gwynne-Jones, D. R. G.
Archimedes.
Nigerian Teach., no. 6, June 1950: 27-32.

The story of Archimedes (as told to pupils) with suggestions for some practical work on some of Archimedes' discoveries (not only the Principle).

ws 119 Haggis, Sheila M.
Chemistry teaching in Ghanaian schools today.
G.A.S.T. Bull., v. 2, no. 2, Dec. 1960: 7-9.

Traditional school chemistry is recognised as being out-of-date; new syllabi for Ghana should be made relevant to life in Ghana, and advantage should be taken of modern methods and knowledge.

ws 120 ----- -----
Cooperating organisations. I. The British Council.
G.A.S.T. Bull., v. 5, no. 1, Apr. 1963: 38.

A summary of the ways in which the British Council helps local schools, and G.A.S.T. in particular.

ws 121 ----- -----
The G.A.S.T. stand at the second development plan exhibition.
G.A.S.T. Bull., Dec. 1959: 4.

A description of the display.

ws 122 ----- -----
The Ghana Association of Science Teachers.
West Af. J. of Ed., v. 2, no. 2, June 1958: 47-48.

A survey of the formation of the Association, its past and present activities and concerns for the future.

ws 123 Haggis, Sheila M.
Ghana Association of Science Teachers. Annual Conference. 1962.
West Af. J. of Ed., v. 6, no. 3, Oct. 1962: 145-146.

Report on the conference held at the University of Ghana, Legon, April 6-9, 1962.

ws 124 ----- -----
Ghana Association of Science Teachers Secretary-Treasurer's report 1960-61.
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 32-35.

Finance; membership; local branches; sub-committees; subject panels; publications; representation on other associations; sixth form conference; refresher courses; essay competitions; income and expenditure account.

ws 125 ----- -----
Impressions of the Science Masters' Association of Great Britain summer conference held in July at the University of Durham.
G.A.S.T. Bull., Dec. 1959: 9-10.

ws 126 ----- -----
Projects of promise. A junior science room.
West Af. J. of Ed., v. 7, no. 2, June 1963: 98.

An account of the very economical adaptation of a classroom to give facilities for simple experiments in science, with indications of some of the projects which were subsequently undertaken in the room.

ws 127 ----- -----
Report of the buildings and equipment sub-committee.
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 41.

Two booklets have been completed.

ws 128 ----- -----
Science teaching in Ghana
Ghana Teach. J., v. 37, no. 1, Jan. 1963: 38-42.

Consideration, in the light of modern science, and of the process of science, of the needs of school science curricula.

ws 129 ----- -----
Secretary's report of the annual conference. 1962.
G.A.S.T. Bull., v. 4, no. 2, Oct. 1962: 16-19.

A short resumé of the activities and discussions of the conference, the general theme of which was 'the school science curriculum'.

ws 130 Haggis, Sheila M.
Secretary-Treasurer's report.
G.A.S.T. Bull., v. 5, no. 2, Oct. 1963: 4-6.

Finance; membership; publications; subject panels; curriculum committee; laboratory assistants; local branches; Joint Consultative Council of Teachers' Associations; essay competition; Unesco survey; Rural Science Teachers' Association.

ws 131 ----- -----
Sixth form chemistry conference.
G.A.S.T. Bull., v. 4, no. 1, Apr. 1962: 30-32.

A four day conference for sixth form pupils sponsored by G.A.S.T. and intended to 'fill in the gaps in the normal sixth-form course' by concentrating on practical applications of chemistry in Ghana and on modern chemical theory.

ws 132 ----- -----
Sixth form chemistry conference in Ghana.
West Af. J. of Ed., v. 6, no. 2, June 1962: 98-99.

Report on the activities at a four day conference attended by sixth form students and teachers: themes of practical application of chemistry in Ghana, and modern aspects of chemical theory.

ws 133 ----- -----
Ten years of the Ghana Association of Science Teachers. Retrospect and prospect.
In G.A.S.T. 1955-1965. Addresses Given at the Tenth Annual Conference. 1965.
Ghana Association of Science Teachers, 1965: 13-17.

See (ws 94).

A brief historical outline of G.A.S.T., achievements, and areas for possible future work.

ws 134 Haizel, G.
Specimens in the teaching of nature study in the primary school.
Ghana Teach. J., v. 20, no. 4, Oct. 1958. 12-15.

ws 135 Hall, J. B.
Biological supply agency.
G.A.S.T. Bull., v. 4, no. 1, Apr. 1962: 20-23.

A detailed report on the reasons for advocating a biological supply agency in Ghana, the possible markets for its specimens, the services it should provide and the practical details (e.g. cost) of establishing it.

ws 136 Hall, J. B.
Experimental work in biology. Synopsis of talk by J. B. Hall at G.A.S.T. refresher course Easter 1963.
G.A.S.T. Bull., v. 5, no. 2, Oct. 1963: 22-27.

Some pointers to the direction which school biology should take. Sources (books, people, and organisations) of information relevant to biology in West Africa are given.

ws 137 ----- -----
G.C.E. A-level zoology - sharks for dissection.
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 63.

How teachers may obtain sharks, as local types, for dissection.

ws 138 ----- -----
Meeting of biology panel of G.A.S.T. with the University of London A-level Zoology Moderator.
G.A.S.T. Bull., v. 4, no. 1, Apr. 1962: 15-19.

London's answers to queries about: lack of guidance in the syllabus; types in the syllabus; supplies of specimens for practical examinations.

ws 139 ----- -----
Report of the biology panel.
G.A.S.T. Bull., v. [3] no. 2, Oct. 1961: 43-44.

Reporting on the meetings on A-level syllabus and apparatus and laboratory plans for sixth form biology.

ws 140 ----- -----
Report of the biology panel of G.A.S.T., 1962 - 1963.
G.A.S.T. Bull., v. 5, no. 2, Oct. 1963: 7-8.

Members of the panel; refresher course (Easter 1962); apparatus lists for VIth Form biology; fish supplies from Tema; Biological Supply Agency; syllabuses for four year course; revision of W.A.S.C. biology syllabus; A-level examinations.

ws 141 ----- -----
Report of the biology panel of Ghana Association of Science Teachers 1961 - 1962.
G.A.S.T. Bull., v. 4, no. 2, Oct. 1962: 50-52.

Notes on the activities of the panel and schemes which it has inaugurated.

ws 142 Hall, J. B.
Report of the study group on G.C.E. A-level botany and zoology syllabuses.
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 46-49.

Problems arising as a result of the change-over from Cambridge to London syllabuses: differences in outlook between the examining bodies; information on local types; queries on the syllabuses; suggestions for changes in the syllabuses; zoology practical examinations; W.A.E.C. circulars.

ws 143 Hallett, J. D.
The development of science syllabuses for Commonwealth West Africa.
Education in Science, v. 22, Apr. 1967: 42-44.

An account of the ways in which the West African Examinations Council uses its freedom from the inertia of long-established tradition in attempting to satisfy the requirements of the various groups (pupils, teachers, administrators, universities) affected by O-level and A-level syllabuses.

ws 144 ----- -----
Practical examinations in physics.
G.A.S.T. Bull., v. 6, no. 2, Oct. 1965: 35-37.

Considers the problem of evaluating a pupil's skill and understanding in the conventional practical examinations. Outlines suggestions for examinations involving several short tests of required skills with one longer question involving a complete experiment.

ws 145 ----- -----
Report on 6th form science teachers' course.
Jour. of S.T.A.N., v. 6, no. 2, Aug. 1967: 45-46.

General assessment; subject group reports; further activities.

ws 146 ----- -----
The science sixth form in Ghana.
West Af. J. of Ed., v. 9, no. 3, Oct. 1965: 134-137.

A discussion of the relative merits of the sixth form, centered around two issues: (1) the purpose of the form and (2) how efficiently this purpose has been achieved. The views of the Ghana science teachers are considered. The article concludes that the sixth form should be continued and that university preliminary courses should be allowed 'to wither away'.

ws 147 Hallett, J. D.
Units and symbols in physics.
Jour. of S.T.A.N., v. 6, no. 2, Aug. 1967: 29-30.

Urges the use of internationally agreed symbols for units, while admitting the problem of out-of-date textbooks, teachers and examination papers. A table of the agreed units is included.

ws 148 Hartley, E. M.
Sixth form scientists in Ghana and recruitment to university courses.
West Af. J. of Ed., v. 9, no. 3, Oct. 1965: 132-133.

A survey of the subsequent course of sixth form science leavers who received two A-level passes and of students who enrolled at the University of Ghana to take degrees in science and medicine. The survey indicates the percentages of science leavers who go directly on to the University, who go abroad, and who 'mark time' before university entrance.

ws 149 Heafford, P. E.
Address to the annual conference.
G.A.S.T. Bull., v. 4, no. 2, Oct. 1962: 19-26.

On shaping the course ~~of human~~ history by men of science.

ws 150 Heafford, P. E. and H. C. Babb
The teaching of science in Ghana.
G.A.S.T. Bull., v. 4, no. 2, Oct. 1962: 26-40.

Extract from a report submitted at the request of the Ministry of Education, Ghana. Contains recommendations, a proposed syllabus for use in science centres, and notes on a two week course held for teacher training college tutors.

ws 151 Herrington, G. N.
Accounts for 1965 and Treasurer's report.
Jour. of S.T.A.N., v. 5, no. 3, Oct. 1966: 28, 30.

ws 152 ----- -----
The role of agriculture in school science.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 33-34.

ws 153 Hopkins, Brian
The Science Association of Nigeria. A report on the second annual conference.
West Af. J. of Ed., v. 4, no. 3, Oct. 1960: 107.

ws 154 Howell, Gareth
The use of models in the teaching of chemistry.
Jour. of S.T.A.N., v. 6, no. 2, Aug. 1967: 31-38.

Why use models?; types of models; making models; specific instructions (diamond, graphite, and nine common 'molecules'); colors for representing electronegativity and partial charge.

ws 155 Howson, A. G.
The Western Nigerian Science Project.
Commonwealth Ed. Liaison Committee Newsletter, 1967.

An attempt is being made in certain schools in Western Nigeria to create a revised secondary school science course based on the work of the Nuffield Science Teaching Project.

ws 156 Huntley, H. E.
Education through science.
Gold Coast Assoc. of Sci. Teach., n.d. 11 p.

An address given at the inaugural meeting of the Gold Coast Association of Science Teachers, 5th November, 1955, at Achimota School. Discusses two main questions: (1) knowing what we expect of an educated man, are we satisfied that a predominantly scientific training can provide it?; (2) what is the place of science in human affairs?

ws 157 Inameti, A., H. J. Killick, and F. D. Reading
The Lagos 1966 "Ashby" Course for primary science teachers.
Jour. of S.T.A.N., v. 5, no. 3, Oct. 1966: 36-40.

The Ashby Course for teaching of science; the course in action (pendulum project; multi-experiment; approach to hydrostatics; a 'Nuffield' investigation of a railway signal); message to primary school teachers in Nigeria.

ws 158 Jones, R. L.
A new approach to the teaching of Mendelian inheritance.
West Af. J. of Ed., v. 8, no. 3, Oct. 1964: 158-160.

Sickle-cell anaemia as a topic for practical work in genetics; technique for testing is given. (See the following article, Sickle Cell Anaemia, by Prof. R. G. Hendricks in the same journal.)

ws 159 ----- -----
Simple applications of science.
Ghana Teach. J., v. 37, no. 1, Jan. 1963: 25-30.

Specific ways in which knowledge of science can release Ghanaians from the fear of witchcraft.

ws 160 Joy, Derek C.
The teaching of evolution.
Jour. of S.T.A.N., v. 6, no. 2, Aug. 1967: 39-40.

See McFarlane, M. G. (ws 181).

A reply to Mr. M. G. McFarlane's article; pointing out problems for Nigerian students in accepting the dogmata of evolution.

ws 161 Kamalamanthan, K.
Science in junior schools.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 18-22.

ws 162 ----- -----
A simple aid to teaching of light in plane mirrors.
West Af. J. of Ed., v. 11, no. 2, June 1967: 100-102.

Paper-folding technique as an aid to the understanding of object-image relationships in plane mirrors.

ws 163 Kane-Mensah, J. J.
Science teaching in Ghanaian schools.
Paper (C.T.S.(c)4(c)(6)) read at the plenary session of the Commonwealth Conference on the Teaching of Science in Schools, University of Ceylon, Peradeniya, Ceylon, 9 Dec. to 21 Dec. 1963.
MIE

See also Commonwealth Conference on the Teaching of Science in Schools. 1963. (g 10)

A brief but fairly detailed overview of science education and the general educational structure of the Ghanaian system.

ws 164 Kelly, P. J.
The Nuffield Science Teaching Project.
Jour. of S.T.A.N., v. 6, no. 1, May 1967: 13-16.
Reprinted from The Science Teacher, Jan. 1967.

Examines the Nuffield project from an American point of view, interpreting it to American readers.

ws 165 Kesse, G. O.
Geology as a school science.
G.A.S.T. Bull., v. 7, no. 1, Apr./July 1966: 23-26.

ws 166 Killick, H. J.
Ecology in Lagos.
Jour. of S.T.A.N., v. 6, no. 2, Aug. 1967: 13-15.

Description of some work done by biology teachers during a seminar at Lagos. General notes on procedure are followed by a detailed account of experiments on the ecology of hermit crabs.

ws 167 Killick, H. J.
A general science workshop in Northern Nigeria.
Jour. of S.T.A.N., v. 5, no. 2, May 1966: 19-21.

List of participants and activities. Includes a description of problems in general science in Northern Nigeria and a syllabus which was drawn up at the conference in response to these problems.

ws 168 ----- -----
A new teaching approach to the growth of biological populations. Experiments on Duckweed.
Jour. of S.T.A.N., v. 5, no. 2, May 1966: 2-3.

The use of Duckweed; the suggested experimental method; refinements of method; what is usually observed?; suggested further experiments. With graphs and a mathematical note.

ws 169 ----- -----
Report of S.T.A.N. biology section for 1966.
Jour. of S.T.A.N., v. 5, no. 4, Dec. 1966: 39-43.

Report on the activities of a conference held by the section.

ws 170 ----- -----
Report of the W.A.E.C. international biology panel.
Jour. of S.T.A.N., v. 5, no. 4, Dec. 1966: 21-34.

Includes a detailed A-level bioloby syllabus and A-level biology specimen questions.

ws 171 Laing, Pople E.
Caution in biology.
G.A.S.T. Bull., v. 5, no. 2, Oct. 1963: 28-29.

Some pointers to sound biology for the guidance of the beginner in biological research.

ws 172 Laing, Pople E. and George W. Lawson
The discovery of Hydra in West Africa.
G.A.S.T. Bull., v. 5, no. 1, Apr. 1963: 36-37.

How and where Hydra was discovered in West Africa; with drawings.

ws 173 Lamptey, J. Kwesi
Report on Bulletin 1960-61.
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 36-37.

The Bulletin is now printed (previously mimeographed) with advertisements offsetting the cost; editorial board has been appointed; plea for articles, and a statement of financial viability.

ws 174 Lamptey, J. Kwesi
Weeds.
G.A.S.T. Bull., v. 2, no. 2, Dec. 1960: 17-20.

The author outlines the factors which enable various types of weed to spread rapidly and to resist eradication. He then enumerates methods by which farmers can attempt to control weeds.

ws 175 Lang, R. C.
Primary school science.
Jour. of S.T.A.N., v. 5, no. 4, Dec. 1966: 9.

Brief description of recent activities in upgrading teachers and teaching in primary school science.

ws 176 Lawson, George W.
Statistics relating to students taking botany at the University of Ghana. The first decade.
G.A.S.T. Bull., v. 4, no. 1, Apr. 1962: 11-13.

ws 177 Lewis, L. J.
The nature of science and its meaning to the community.
West Af. J. of Ed., v. 2, no. 2, June 1958: 53-57.

Implications of scientific advance with consideration of the role of the Science Teachers' Association in the community.

ws 178 ----- -----
Science and observation - I.
Gold Coast Ed., v. 1, May 1952: 53-56.

See also Oddoye, J. G. (ws 222, ws 223).

Disciplined observation can be undertaken even without laboratory facilities; the value of bird-watching as a scientific study is outlined, with methods of recording observations.

ws 179 Liberia, Department of Public Instruction
Biology curriculum guide for senior high school.
Dept. of Public Instruction, Division of Higher Ed. and Textbook Research, Monrovia, 1962. 19 p.
RCA

ws 180 ----- -----
Chemistry curriculum guide for senior high school.
Dept. of Public Instruction, Division of Higher Ed. and Textbook Research, Monrovia, 1962. 19 p. diags.
RCA

ws 181 McFarlane, M. G.
The teaching of evolution.
Jour. of S.T.A.N., v. 6, no. 1, May 1967: 11-12.

See also: Ciparick, J. D. (ws 39);
Joy, Derek C. (ws 160).

The concept of evolution is necessary in modern biology but poses particular problems in a society which as a whole, rejects the idea; pupils should study evidence for and against evolution to see that evolution is reasonable; methods of realising this are considered.

ws 182 Mayes, C.
Science teaching in Nigeria.
Oversea Ed., v. 5, no. 3, Apr. 1934: 105-106.
LC, LIE

Account of an exhibition of school work held in 1934 as part of the Science Masters' Association annual meeting.

ws 183 Memorandum of educational policy in Nigeria.
S.P. [Sessional Paper] No. 20, 1947.

ws 184 Mettle, Jonathan and John Vanderpuije
Organisms of the inter-tidal zone at Elmina - a preliminary report on studies.
G.A.S.T. Bull., v. 2, no. 2, Dec. 1960: 9-11.

An account of an ecological survey on the Ghanaian coast.

ws 185 Moodley, G. S.
Western Region report.
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 38-39.

ws 186 Moody, K. W.
Science teaching: one layman's point of view.
Jour. of S.T.A.N., v. 6, no. 2, Aug. 1967: 16-17.

Pupils need to learn how to apply scientific procedures to problem solving. Textbooks largely 'kill' this approach by supplying the facts. The author therefore proposes the investigation (in science lessons) of some unusual, non-textbook problems for which the answers are not already known.

ws 187 Morgan, Denys
The apparent dichotomy between the humanities and natural science.
G.A.S.T. Bull., v. 3, no. 1, Mar. 1961: 20-24.

An essay in which the author tries 'to present some interpretations of the dilema of the lack of understanding of science amongst thinking people, which drives barriers deeply into both our intellectual and non-intellectual society.'

ws 188 Morgan, Denys
Biology in the secondary school curriculum.
The Author, Kumasi, 1964. 5 p.
RCA

ws 189 ----- -----
[British Association for the Advancement of Science], 1959.
G.A.S.T. Bull., Dec. 1959: 7-9.

Report on the annual meeting held in York, England, Sept. 2nd to 9th, 1959. Some members of G.A.S.T. attended the meeting.

ws 190 ----- -----
A consideration of exercises suitable for inclusion in the practical biology examination at the school certificate level.
G.A.S.T. Bull., v. 2, no. 1, June 1960: 22-32.

Biological studies at the School Certificate level should include a high proportion of experimentation with and on living matter. The author gives details of seven physiology experiments which he has used in teaching in both Britain and Ghana.

ws 191 ----- -----
The formation of yellow-orange pigments in the higher land plants.
G.A.S.T. Bull., v. 2, no. 2, Dec. 1960: 12-16.

A historical account of the research into yellow-orange pigments, the methods used in separating and identifying them, and the controversies about their identies and methods of formation.

ws 192 ----- -----
List of firms supplying laboratory apparatus, general equipment, chemical reagents, field apparatus, telescopes, etc.
G.A.S.T. Bull., Dec. 1959: 31-35.

ws 193 ----- -----
Modernization of secondary level curricula and the teaching of biological sciences.
West Af. J. of Ed., v. 11, no. 1, Feb. 1967: 8-12.

Present situation surveyed; neglect of local material; factors retarding program reform; value of a field studies center; impact of improved biology teaching on the whole community.

ws 194 Morgan, Denys
National science teaching improvement centres.
Jour. of S.T.A.N., v. 6, no. 2, Aug. 1967: 6-8.

Outlines a Unesco scheme to make science teaching more relevant to life in a technologically-oriented society. National centers coordinate continuous renewal of curricula, teaching materials and methods. Functions and staffing of such centers and their relationship with teacher training colleges are considered.

ws 195 ----- -----
Notes.
G.A.S.T. Bull., Dec. 1959: 19-20.

Obtaining distilled water; deep freezing technique for the preservation of biological specimens.

ws 196 ----- -----
The relevance of science and technology in general education.
Jour. of S.T.A.N., v. 6, no. 2, Aug. 1967: 22-28.

Priorities in science teaching are outlined; factors involved in long-range research planning; contribution of biological sciences; nature conservation and natural resources; biotechnology; search for new knowledge and the role of basic and applied studies; nitrogen fixation; photosynthesis; fermentation; economic planning; biotechnology and the future.

ws 197 ----- -----
Report on the laboratory assistants sub-committee.
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 39-40.

A report has been prepared on the syllabus and examination for laboratory assistants and the preparation of specimen papers.

ws 198 ----- -----
Report of the sub-committee on textbooks and publications.
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 40-41.

Committee to coordinate information in the writing of textbooks and similar publications sponsored by the Association. Already potential authors have been advised and put in touch with publishers. Some books are already in preparation and some are completed.

ws 199 Morgan, Denys
Some aspects of the problem of early specialization in education.
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 57-62.

'Total education' is not achieved by tacking 'cultural afterthoughts' onto specialist studies, but by seeking new dimensions in these studies. There is need for synthesis of specialist studies (in British tradition) with breadth (as in the U.S.A.). Concludes with seven ideas for development of education (as opposed to 'fact collecting') in the sixth form.

ws 200 ----- -----
Some hints on the maintenance of laboratory bench tops.
G.A.S.T. Bull., June 1959: 28-29.

Details on the preparation and application of some solutions and general maintenance.

ws 201 Nature study - an opportunity for original work.
Nigerian Teach., v. 1, no. 1, 1933: 7-9.

ws 202 Naqvi, S. H. Z.
Collecting, culturing and preserving (the common examples of micro-organisms prescribed in School Certificate).
Jour. of S.T.A.N., v. 5, no. 3, Oct. 1966: 41-43.

An attempt is made to suggest to the teacher (1) typical ecological situations where such materials may reasonably be expected to be found, (2) types of materials that may be secured which will be of use in the classroom, and (3) methods of collecting, culturing and preserving such material.

ws 203 ----- -----
Form and function in micro-organisms - fungi.
Jour. of S.T.A.N., v. 5, no. 2, May 1966: 23-27.

Occurance; nutrition; carbon metabolism; economic importance. Includes information on biochemical pathways and references.

ws 204 Ndaguba, Charles
An account of a school excursion to Okitankwo stream.
Nigerian Teach., v. 1, no. 5, 1935: 35-36.

Four groups (geologists, botanists, zoologists and ornithologists/entomologists) composed of teachers and pupils, undertake an excursion.

ws 205 ----- -----
Experimental work in schools.
Nigerian Teach., v. 1, no. 2, 1934: 52-53.

How to make a rain gauge and weather vane; with a sample chart of observations.

ws 206 Ndu, L. O.
Report from the chemistry section. Refresher course for sixth form chemistry teachers. 28 March - 4 April 1966.
Jour. of S.T.A.N., v. 5, no. 2, May 1966: 27, 54.

ws 207 Nemiroff, Michael
Titration study.
Jour. of S.T.A.N., v. 5, no. 2, May 1966: 14-18.

Report of experiments on the suitability of various indicatios for titrating strong and weak bases against strong acids. Includes titration curves for three typical cases.

ws 208 Nigeria, The Delegation
Recent experiments in the teaching of science. Nigeria. Paper (C.T.S.(c)4(c)(5)) read at the plenary session of the Commonwealth Conference on the Teaching of Science in Schools, University of Ceylon, Peradeniya, Ceylon, 9 Dec. to 21 Dec. 1963.
MIE

See also Commonwealth Conference on the Teaching of Science in Schools. 1963. (g 10)

ws 209 Nigeria, Federal Minister of Education
Address by the Honourable Federal Minister of Education at the opening ceremony of the 1965 annual conference of the Science Teachers' Association of Nigeria.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 4-6.

ws 210 Nigeria, Northern, Ministry of Education
Rural science syllabus for secondary schools.
Ministry of Education, Zaria, n.d.

ws 211 Nigeria, Western, Ministry of Education
General science for modern living. Teachers' notes.
Ministry of Education, Ibadan, 1965.
RCA

Teachers' notes for a series of televised lessons for secondary schools. First term 1965. Produced for the Ministry of Education by J. Allen Martin.

ws 212 [Nigerian Publishers' Association]
Resolution from the Nigerian Publishers' Association.
Jour. of S.T.A.N., v. 5, no. 2, May 1966: 53-54.

ws 213 Nigeria's pilot work in teaching elementary science.
Times Ed. Supp., 2652, 18 Mar. 1966: 816.

Describes attempts to encourage primary school children to think in terms of cause and effect, learn measurements, and gain manipulative skills.

ws 214 Ninan, V.
The origin and development of islets and vein-endings in Smilax aspera (L).
Jour. of S.T.A.N., v. 5, no. 4, Dec. 1966: 48-51.

Experimental observations, including materials and methods.

ws 215 ----- -----
Report of the Nigerian Flora Committee.
Jour. of S.T.A.N., v. 5, no. 3, Oct. 1966: 35.

Brief report on activities.

ws 216 ----- -----
Report on the regional planning seminar of the Unesco Pilot Project on New Approaches and Techniques in Biology Teaching in Africa, held at the University of Cape Coast, Ghana, 14-24 Feb. 1967.
Jour. of S.T.A.N., v. 6, no. 1, May 1967: 17-19.

ws 217 Nixon, I. T.
How to save money in chemistry. Or a cheap alternative to the Kipp's apparatus.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 48-50.

ws 218 Njoku, Eni
Course of experimental science for secondary schools.
Jour. of S.T.A.N., v. 5, no. 4, Dec. 1966: 43-44.

Briefly discusses the scientific manpower needs of Nigeria over the next 15 years.

ws 219 Nkrumah, Kwame
Message by Osagyefo Dr. Kwame Nkrumah to the conference of teachers' associations at the University College on Thursday, 6th April 1961, at 8:30 p.m.
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 11-14.

On the importance and purposes of education in Ghana in relation to economic and political development of the country; plans for expansion and diversification of educational facilities.

ws 220 Notes on grammatical and scientific terminology in Yoruba language.
The Grammatical and Scientific Terminology Committees, Nigeria, 1956. 8 p.
UI

ws 221 Nwana, O. C.
Nigerian teachers and the biology syllabus.
Teach. Ed., v. 8, no. 1, May 1967: 20-35.
CUR, IEN, LC, LIE,
NCT, O, SwU

Summarises the results of two studies on the West African School Certificate biology syllabus.

ws 222 Oddoye, J. G.
Science and observation - II.
Gold Coast Ed., v. 2, Sept. 1952: 50-55.

See also: Lewis, L. J. (ws 178);
Oddoye, J. G. (ws 223).

Insects: general introduction, including structure and suggestions for practical work.

ws 223 ----- -----
Science and observation - III.
Gold Coast Ed., v. 1, Jan. 1953: 51 +.

See also: Lewis, L. J. (ws 178);
Oddoye, J. G. (ws 222).

Nine principles for teachers, with some examples of their application.

ws 224 Odigbo, C. A.
The facilities for science teaching in Nigeria.
West Af. J. of Ed., v. 4, no. 2, June 1960: 80-84.

Two problems are considered: (1) inadequate laboratory facilities and its repercussions and (2) science teachers deserve higher status than at present, in view of the value and extent of their service.

ws 225 Ogunlade, R. A.
Report of the biology section. The A-level biology syllabus.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 32-33.

ws 226 Opeola, S. Modupeola
Tomato bread.
Jour. of S.T.A.N., v. 6, no. 2, Aug. 1967: 9-12.

A teacher outlines his experiments with tomato juice as a sugar solution for yeast culture, and the successful cooperation of the science and domestic science departments in baking tomato flavored bread.

ws 227 Osborne, Denis G.
The new physics.
West Af. J. of Ed., v. 8, no. 2, June 1964: 107-109.

Modern schemes for physics convey ideas rather than descriptions; this approach calls for new syllabuses and new examining techniques.

ws 228 Oyewole, 'Dotun
Chief editor's report. August 1965 - August 1966.
Jour. of S.T.A.N., v. 5, no. 3, Oct. 1966: 32.

ws 229 ----- -----
Report of the physics international panel of the West African Examinations Council.
Jour. of S.T.A.N., v. 5, no. 4, Dec. 1966: 17-19.

W.A.E.C. A-level physics: physics practicals at the O-level (restrictions on the choice of questions); A-level practical physics; physics with mathematics syllabus; report on field test of the pantoperic type of practical physics at the O-level; practical units notation.

ws 230 Oyewole, 'Femi
The national chairman's opening remarks.
Jour. of S.T.A.N., v. 5, no. 3, Oct. 1966: 4-8.

Annual conference, 1966. Including brief remarks on the history of S.T.A.N.

ws 231 ----- -----
Presidential address. 7th Annual conference. August 30 - September 2, 1965.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 8-12.

ws 232 ----- -----
Report of the W.A.E.C. chemistry working party on the chemistry international panel.
Jour. of S.T.A.N., v. 5, no. 4, Dec. 1966: 11-17.

Includes specimen theory questions.

ws 233 Oyinsan, I. O.
Nature study.
Nigerian Teach., v. 2, no. 6, 1936: 56.

Some studies being done in the C.M.S. school at Efon Alayi.

ws 234 Oyo, G. B.
Notes on some of the common natural orders.
Nigerian Teach., no. 7, June 1936: 26-28.

ws 235 Palm wine for chemistry.
Times Ed. Supp., 2425, 10 Nov. 1961: 638.

ws 236 Payne, V. F.
Single deflection weighing.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 42-43.

ws 237 Phipps, J.
The choice of types for courses in zoology in West Africa.
West Af. J. of Ed., v. 5, no. 1, Feb. 1961: 5-8.

Animals traditionally studied in zoology courses are often unsatisfactory choices for Africa; suggestions for local types, their availability, culturability and syllabus value are considered.

ws 238 Pretty, J. E.
Mechanics in school mathematics. Some suggestions.
West Af. J. of Ed., v. 7, no. 3, Oct. 1963: 162-165.

Consideration of some problems arising from traditional (school) definitions of mechanical terms.

ws 239 Prior, Kenneth
Science in rural Nigeria.
Oversea Ed., v. 19, no. 1, Oct. 1947: 585-589.
LC, LIE

Rural science is a combination of agriculture, hygiene and nature study. Each school establishes farm plots on scientific principles, promoting integration of time-table subjects. Improved farming techniqes reach the local community as a result of demonstrated benefits (examples quoted).

ws 240 Quaye, Emmanuel
What science could do for Ghana - agriculture.
G.A.S.T. Bull., Dec. 1959: 5-7.

Winning essay of the 1958 science essay prize.

ws 241 Redhead, Joyce B.
Introductory address delivered by Dr. Redhead at the sixth form chemistry teachers' course ... University of Ibadan ... March 1966.
Jour. of S.T.A.N., v. 5, no. 2, May 1966: 11-13.

Background and preview of the course which was concerned with the proposed new West African A-level chemistry syllabus.

ws 242 Richards, J.
The new chemistry syllabus.
West Af. J. of Ed., v. 8, no. 2, June 1964: 110-113.

Modern chemistry is not an addendum to traditional chemistry, but demands change throughout the syllabus; possible future trends, practical work and examinations are considered.

ws 243 Richmond, P. E.
Science in the primary school.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 16-18.

ws 244 Rosa, Sister
Astronomy in the science syllabus.
G.A.S.T. Bull., v. 4, no. 2, Oct. 1962: 49-50.

A suggested secondary school science astronomy course syllabus put forth for comment by G.A.S.T. members.

ws 245 Rosenberg, Sherman
C.B.A., the Chemical Bond Approach. Address to G.A.S.T. refresher course Easter 1963.
G.A.S.T. Bull., v. 5, no. 2, Oct. 1963: 15-21.

An introduction to the philosophy and practice of one of the modern American chemistry courses.

ws 246 Samuel, P. S.
General Secretary's report for 1965-66.
Jour. of S.T.A.N., v. 5, no. 3, Oct. 1966: 23-25.

Membership; branches; representation on various committees and panels; activities during the year; international contacts; annual conference 1966.

ws 247 ----- -----
Proceeding of the annual conference 22-27 August 1966.
Jour. of S.T.A.N., v. 5, no. 4, Dec. 1966: 5-6.

Activities of the conference.

ws 248 ----- -----
Report on the biological supply unit.
Jour. of S.T.A.N., v. 5, no. 3, Oct. 1966: 35.

A note.

ws 249 Sawyer, Ebun
Science education in the secondary schools of the Western Area, Sierra Leone.
West Af. J. of Ed., v. 11, no. 1, Feb. 1967: 31-35.

The author visited sixteen schools and surveyed the patterns of science teaching; chart gives a detailed breakdown of the results of his observations.

ws 250 Schweibert, Mr. and Mrs.
Report on the 10th annual conference, April 1965.
G.A.S.T. Bull., v. 6, no. 2, Oct. 1965: 18-20.

A short account of each of the main talks and demonstrations during the conference.

ws 251 Science exhibition at Cape Coast.
G.A.S.T. Bull., v. 2, no. 1, June 1960: 32-33.

An announcement of an exhibition in celebration of the fiftieth year of foundation of Adisadel College, Cape Coast.

SCIENCE TEACHERS' ASSOCIATION OF NIGERIA

Also known as S.T.A.N.

Conferences and Meetings

ws 252 Science Teachers' Association of Nigeria
Annual conference 1966: a tentative programme.
Jour. of S.T.A.N., v. 5, no. 2, May 1966: 55-56.

ws 253 ----- -----
Annual general meeting resolutions.
Jour. of S.T.A.N., v. 5, no. 4, Dec. 1966: 6-7.

ws 254 ----- -----
1966 Conference activities.
Jour. of S.T.A.N., v. 5, no. 3, Oct. 1966: 35-36.

Excursions; films; exhibitions.

ws 255 ----- -----
Conference resolutions.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 40-42.

ws 256 ----- -----
Eighth annual conference, 1966. Preliminary notice.
Jour. of S.T.A.N., v. 5, no. 2, May 1966: 9.

ws 257 Science Teachers' Association of Nigeria
Proceedings of the S.T.A.N. conference. 30th August to 2nd September 1965.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 2-4.

Conferences and Meetings

See also: Chadwick, B. T. (ws 28);
Samuel, P. S. (ws 247);
Science Teachers' Association of Nigeria. News and Notes. (ws 261).

Journal: Journal of S.T.A.N.

ws 258 Science Teachers' Association of Nigeria
Hints for reviewers.
Jour. of S.T.A.N., v. 5, no. 2, May 1966: 51.

ws 259 ----- -----
S.T.A.N. Journal: Editors' report 1964/1965.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 40.

Journal: Journal of S.T.A.N.

See also Oyewole, 'Dotun (ws 228).

Library

ws 260 Science Teachers' Association of Nigeria
S.T.A.N. library.
Jour. of S.T.A.N., v. 5, no. 2, May 1966: 37-51.

List of the S.T.A.N. library holdings at the Institute of Education, University of Ibadan, Ibadan, Nigeria.

News and Notes

ws 261 Science Teachers' Association of Nigeria
Association news.
Jour. of S.T.A.N., v. 6, no. 1, May 1967: 30-35.

From the General Secretary's desk; Ibadan ecology workshop; 1967 annual conference; sectional reports (physics, chemistry); visit of Mr. P. J. Kelly to Nigeria; biology objective question scheme.

ws 262 ----- -----
Association news.
Jour. of S.T.A.N., v. 6, no. 2, Aug. 1967: 50-51.

From the General Secretary's desk; report of Lagos branch.

ws 263 Science Teachers' Association of Nigeria
Biology notes and comments.
Jour. of S.T.A.N., v. 6, no. 1, May 1967: 27-29.

Field centres in Nigeria; selections of Bryophyte types in Nigerian schools; Bladderwort (Utricularia) in Nigerian biology teaching; biology materials in Nigeria; Nigerian entomologists' magazine.

ws 264 ----- -----
Branch activities.
Jour. of S.T.A.N., v. 5, no. 2, May 1966: 53.

A short note.

ws 265 ----- -----
Reports from branches.
Jour. of S.T.A.N., v. 5, no. 4, Dec. 1966: 36-39.

Aba branch; Abeokuta branch; Benin/Midwest branch; Ekiti branch; Enugu branch; Ibadan branch; Kabba branch; Lagos branch; Ondo branch; Onitsha branch; Uyo-Annang branch; Warri branch.

ws 266 ----- -----
Report from Ibadan branch.
Jour. of S.T.A.N., v. 5, no. 2, May 1966: 31.

ws 267 ----- -----
Report from Lagos branch.
Jour. of S.T.A.N., v. 5, no. 2, May 1966: 31.

ws 268 ----- -----
Trip to Kainji Dam. Ibadan branch.
Jour. of S.T.A.N., v. 5, no. 2, May 1966: 4.

A note.

News and Notes

See also Wood-Robinson, Colin (ws 318).

Publications and General Articles

No entry.

Secretary/Treasurer's Reports and Chairman's Reports and Messages

ws 269 Science Teachers' Association of Nigeria
General Secretary's annual report for 1964-1965.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 35-36.

ws 270 Science Teachers' Association of Nigeria
Treasurer's report (1964-1965).
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 37-38.

ws 271 ----- -----
Treasurer's report of the accounts of the Association for 1966.
Jour. of S.T.A.N., v. 6, no. 1, May 1967: 20-21.

Secretary/Treasurer's Reports and Chairman's Reports and Messages

See also: Awokoya, S. O. (ws 7);
Bevan, C. W. L. (ws 19);
Herrington, G. N. (ws 151);
Oyewole, 'Femi (ws 230, 231);
Samuel, P. S. (ws 246);
Science Teachers' Association of Nigeria. News and Notes. (ws 261, 262).

Sub-committee, Joint Study Group and Panel Reports

ws 272 Science Teachers' Association of Nigeria
Report from the biology section.
Jour. of S.T.A.N., v. 5, no. 2, May 1966: 29.

Report on activities.

ws 273 ----- -----
Report of the chemistry section.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 31.

Report on activities.

ws 274 ----- -----
Report of the physics section.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 29-30.

Report on activities.

ws 275 ----- -----
Report from the physics section.
Jour. of S.T.A.N., v. 5, no. 2, May 1966: 29, 31-37.

Contains a basic list of apparatus for general science physics.

ws 276 ----- -----
Sectional notes and news.
Jour. of S.T.A.N., v. 6, no. 2, Aug. 1967: 49.

Biology, chemistry and physics section reports.

Sub-committee, Joint Study Group and Panel Reports

See also: Killick, H. J. (ws 169);
Ndu, L. O. (ws 206);
Ogunlade, R. A. (ws 225).

ws 277 Science teaching in secondary schools in India.
Jour. of S.T.A.N., v. 6, no. 2, Aug. 1967: 42-45.
Reprinted from The Science Teacher, Jan. 1967.

General information, including science in middle, high and higher secondary school levels; information on teacher training and new trends is included.

ws 278 The scientific education of the arts student.
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 26-31.

A 'wholly-educated' arts student needs in addition to his specialities: numeracy, awareness of nature, understanding of the 'scientific' things he uses in everyday life, a world view incorporating current major scientific theories, and an appreciation of the place of science in assisting research in other subjects.

ws 279 Seminar for biology teachers.
Jour. of S.T.A.N., v. 5, no. 2, May 1966: 54.

A note.

ws 280 Skinner, E. G.
Nature study.
Gold Coast Teach. J., v. 2, June 1956: 59-68.

Difficulty of obtaining useful specimens; advice for various types of practical work; importance of establishing cause and effect, and the need for evidence before making statements including cause.

ws 281 Smith, A.
Farms and gardens to supplement a rural science syllabus for middle schools.
Gold Coast Ed., v. 1, Feb. 1954: 41-47.

See Smith, A. (ws 282) for parts II and III of this series of articles.

ws 282 ----- -----
Rural science in the middle schools of the Gold Coast.
Gold Coast Ed., v. 2, May 1953: 48-53; v. 2, May 1954: 34-39.

See Smith, A. (ws 281) for part I of this series of articles.

ws 283 Smithies, Fred
The report of an investigation of the problems of science teaching in the British West African Colonies with special reference to the training of teachers, and recommendations for its reorganization and development.
Compiled for and submitted to: The Colonial Office Science Research Council by F. Smithies, Colonial Office, Research Dept., Jan. 1950. 305 p. mimeo., tables, appendices, diags.
COL, LIE, O

A comprehensive survey on science education in British West Africa. In addition to general background notes on education, the report covers the following topics: intelligence and aptitude in W. Africa; science teachers and their training; curricula and syllabi; examinations; books, journals and libraries; laboratory buildings; laboratory furniture and fittings; and science apparatus. Extensive appendices are included. The appendices include, among other items, the questionaires which were used as guidelines during the two day visits to the schools and a section on common types of teaching errors which were encountered in the schools. Detailed recommendations are given.

ws 284 Solomon, M. D.
Education in Liberia.
Sci. Ed., v. 43, Apr. 1959: 221-227.
NSU, SwU

A general overview of the educational scene in Liberia by a former Unesco science advisor. Aspects of science educational problems are mentioned.

ws 285 Sorensen, Harley
The science programme at the comprehensive high school, Aiyetoro.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 22-24.

S.T.A.N.

See Science Teachers' Association of Nigeria.

ws 286 Stephens, D. A.
Chemistry panel report 1960-61.
G.A.S.T. Bull., v. 3, no. 2, Oct. 1961: 41-42.

Reports activity on nine aspects of school chemistry and publication (actual or projected) of recommendations in five cases out of the nine.

ws 287 Stone, Robert H.
Introducing biology: the nature diary approach.
West Af. J. of Ed., v. 9, no. 3, Oct. 1965: 151-153.

Description of an introductory biology course for Form I using Mr. Stone's book A Tropical Nature Study which was written from his course notes. In this approach the pupil makes two observations each week - one on a plant and one on an animal.

ws 288 Stone, Robert H.
Sixth-form biology and population density.
West Af. J. of Ed., v. 2, no. 2, June 1958: 51-53.

Social implications of biology - population density as a special case of ecology; shows practical relevance to the school syllabus.

ws 289 ----- -----
Survey of science teaching in Nigerian grammar schools.
Institute of Education, University College, Ibadan, Occasional Publication No. 1, 1960. 111 p. appendices, tables.
BC, LIE, MIE

A survey of the state of science teaching in Nigerian grammar schools - its specific strengths and weaknesses - as a preliminary step towards planning a more effective approach.

ws 290 ----- -----
Yoruba concepts of the natural world in relation to learning science.
Thesis (Ph.D.), University of London, 1967. 542 p. biblio.
LSH

The thesis is an attempt to answer the following questions: (1) Does the traditional lore still play any part in the thinking of present day secondary school students, and, if so, what is the nature and magnitude of its influence?; (2) In what ways, and to what extent, are such students Westernized in their reactions to phenomena and events?; (3) On what factors do conservation of the traditional, on the one hand, and Westernization on the other, depend, so far as Yoruba secondary school students are concerned?; (4) Where the traditional and Western would appear to be incompatible, how do students react to the situation?; (5) What influence does the traditional response to the natural world have at the present time on the learning of the sciences in Yoruba secondary schools?
The methods used in attempting to answer the above questions are described in detail and evaluated.

ws 291 ----- -----
Yoruba lore and the universe.
Institute of Education, University College, Ibadan, Occasional Publication No. 4, 1965. 27 p.

A preliminary attempt to formulate the local lore relating to the natural world, which a school-boy is likely to meet as he grows up in Yoruba-land.

ws 292 Stone, Robert H. and B. Walker
Notes on the collection of biological materials.
West Af. J. of Ed., v. 6, no. 3, Oct. 1962: 128-129.

Where to look for specimens and how to preserve and/or culture them.

ws 293 Suggestions for using the pictures and notes on coal.
Nigerian Teach. (Teaching Aid Supplement), no. 38, Sept. 1958.

Special insert in the center of the magazine; explanatory notes; twelve full page photographs.

ws 294 A syllabus for a four-year course in science.
G.A.S.T. Bull., v. 7, no. 1, Apr./July 1966: 30-36.

ws 295 Szabo, Albert
Teaching about rockets and satellites.
Ghana Teach. J., v. 41, no. 1, Jan. 1964: 33-42.

Nine simple scientific principles gain interest when viewed in relation to space-flight.

ws 296 Taiwo, Diran
The chemistry of the noble gases.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 57-58.

ws 297 Tewiah, T. K.
A study of sea-shore vegetation.
G.A.S.T. Bull., v. 4, no. 1, Apr. 1962: 16-19.

An account of an ecological survey on a coastal beach which has been influenced by human activity. The distribution of plants in two main zones is considered in relation to seasonal changes and human activity.

ws 298 ----- -----
Translocation.
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 49-52.

Discusses various theories about transport of dissolved substances in plants, including mechanisms by which this occurs.

ws 299 Thorp, W. H.
Suggestions for the teaching of nature study.
Nigerian Teach., v. 1, no. 3, 1934: 34-45.

Relate nature study to the environment, with due attention to seasonal changes; proposed schemes for children under 10 years and children over 10 years of age.

ws 300 Uka, N.
The development of time concepts in African children of primary school age.
Institute of Education, University College, Ibadan, Occasional Publication No. 3, 1962. 25 p. diags., tables.
LIE, MIE

The study seeks to investigate the sequence in the development of time concepts in Nigerian culture; the age levels at which the concepts are effectively developed and used in an adult fashion; and the variations within the age groups and social origins as well as between age groups and the sexes.

ws 301 'Visitor'
The Naples Marine Zoological Station
G.A.S.T. Bull., v. 2, no. 2, Dec. 1960: 5-7.

An account of the information and research facilities of the international Stazione Zoologica, with a suggestion as to the value of setting up a similar station in West Africa.

W.A.E.C.

See West African Examinations Council.

ws 302 Ward, A. H.
The battle of the 'dip'.
G.A.S.T. Bull., v. 4, no. 1, Apr. 1962: 10.

ws 303 ----- -----
International Atomic Energy Agency.
G.A.S.T. Bull., v. 4, no. 1, Apr. 1962: 28-30.

An account of a conference in Vienna, attended by twelve representatives from eight countries. Application of isotope methods to agricultural research were considered.

ws 304 Ward, A. H. and E. H. Ward
Which way round is right way round?
G.A.S.T. Bull., v. 5, no. 1, Apr. 1963: 28-35.

A consideration, set in the historical context of Franklin's classic experiments, of the teaching problems arising from the concepts of 'conventional current' and 'electron flow'.

ws 305 Ward, A. H. and J. D. Hallett
Summary of G.A.S.T. thinking on the need to introduce a new course in mathematics and physics at A-level in addition to the principal subject courses.
n.p., n.d. 2 p. mimeo.

Summary of the problems and tentative alternatives to trends in A-level science subject preferences by pre-university students.

ws 306 Ward, E. H.
Escholoziaphin and the teaching of physics.
G.A.S.T. Bull., v. 6, no. 2, Oct. 1965: 21-23.

Physics should be taught in such a way that it becomes 'part of the tissue of the mind, not merely in the verbal memory'. This means teaching through everyday experience. The author gives many examples of science in the daily life of a Ghanaian pupil.

ws 307 ----- -----
Quintet for four voices.
G.A.S.T. Bull., v. 5, no. 1, Apr. 1963: 10-13.

The change from a five year to a four year course in Ghanaian schools will probably necessitate the teaching of general science. Some advantages of a general science approach are considered. Disadvantages (teachers may not feel competent in all three sciences, shortage of time, etc.) call for cooperation. Some solutions are suggested.

ws 308 Watson, Fletcher G.
The curriculum in science for an African school.
Jour. of Research in Sci. Teaching, v. 1, 1963: 244-252.
BnU, ICU, LC

Describes the science curriculum prepared for the comprehensive secondary school in Western Nigeria which was set up by Harvard University.

ws 309 Weaver, E. K.
Science education in Nigeria.
Sci. Ed., v. 48, no. 4, Oct. 1964: 351-361.
NSU, SwU

Observations and reactions to the program of scientific education by an American science teacher, who spent one year in Nigeria working for the government. After considering the educational background the author outlines the program of science education currently being followed. He criticizes this as being too formal and makes specific recommendations for improvement. Finally he considers that any science program must provide a general understanding of the place of science in society and an increasing number of skilled workers who understand scientific method and can apply it to the solution of Nigeria's current and future problems.

ws 310 Welch, A. J.
Cape Coast branch report, 1961.
G.A.S.T. Bull., v. [3], no. 2, Oct. 1961: 37.

ws 311 Welch, A. J.
Film and visual aids review.
G.A.S.T. Bull., v. 2, no. 2, Dec. 1960: 20-23.

Gives information from various publications about advances in the use of visual aids, sources of films on loan, and recommends some films related to the syllabus.

ws 312 ----- -----
Film review I.
G.A.S.T. Bull., June 1959: 22-24.

Review of some science films available in Ghana.

ws 313 ----- -----
Film review II.
G.A.S.T. Bull., Dec. 1959: 20-24.

Reviews of films and a list of film libraries in Ghana.

ws 314 ----- -----
Science films - a neglected medium.
West Af. J. of Ed., v. 3, no. 3, Oct. 1959: 122-126.

Problems of obtaining films suitable for African schools; a report of the initial work and ideas of the G.A.S.T. film panel.

WEST AFRICAN EXAMINATIONS COUNCIL

Also known as W.A.E.C.

ws 315 West African Examinations Council
Draft advanced level biology syllabus.
W.A.E.C., Accra, 1964. 8 p. appendices.
RCA

West African Examinations Council

See also: Deakin, J. (ws 45);
Hallett, J. D. (ws 143);
Killick, H. J. (ws 170);
Oyewole, 'Dotun (ws 229);
Oyewole, 'Femi (ws 232).

ws 316 Weston, S. M.
Safety in the laboratory.
G.A.S.T. Bull., v. 7, no. 1, Apr./July 1966: 20-22.

ws 317 Wilson, J. Y.
Field studies in school biology.
West Af. J. of Ed., v. 3, no. 1, Feb. 1959: 12-16.

Problems of field studies (many species of plants previously unknown to teachers, confusion in naming, etc.); some suggestions for school activities.

ws 318 Wood-Robinson, Colin
Ibadan branch ecology trip.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 53-56.

ws 319 ----- -----
Reports on some local protozoa.
Jour. of S.T.A.N., v. 5, no. 4, Dec. 1966: 44-48.

Hints on how some protozoa may be easily obtained and how to observe them. Includes descriptions and illustrations of some of the more common Nigerian protozoa.

ws 320 Wood-Robinson, Colin, Yejide Aboaba and Sfolahan
Symposium on general science in lower forms of secondary schools.
Jour. of S.T.A.N., v. 5, no. 3, Oct. 1966: 10-20.

Includes questions and answers on general science in lower forms and a survey on (1) qualifications and experience of science teachers in the first two years in grammar school and (2) methods of science teaching in these years.

ws 321 Yoloye, E. A.
Trends in elementary science curricula.
West Af. J. of Ed., v. 10, no. 1, Feb. 1966: 18-21.

Report of the E.S.I. sponsored scheme for primary schools; impetus for reform; reliance on modern understanding of child's psychological development; some practical problems.

ws 322 Zamierowski, Edward
The problems of teaching botany at H.S.C. level.
West Af. J. of Ed., v. 10, no. 3, Oct. 1966: 143-145.

ws 323 ----- -----
Problems of teaching botany at H.S.C. level in Nigeria.
Jour. of S.T.A.N., v. 5, no. 1, Jan. 1966: 34-35.

EASTERN AFRICA
(MATHEMATICS)

em 1 Benignus, Brother
School Mathematics Project (E.A.) maths program.
Tanzanian Math. Bull., v. 2, no. 2, Aug. 1967: 32-36.

Basic philosophy; content.

em 2 Beninati, A.
Editor's page.
Tanzanian Math. Bull., v. 2, no. 3, Aug. 1967: 1.

Note on the first area meeting of the Mathematical Association of Tanzania.

em 3 ----- -----
The experimental new maths testing programme.
Tanzanian Math. Bull., v. 2, no. 2, June 1967: 28-29.

A brief summary of the results of a testing programme to measure the effectiveness of the Entebbe, S.M.P. and 'standard' mathematics courses.

em 4 ----- -----
New mathematics in Tanzania.
Tanzania Ed. J., v. 2, no. 7, Sept. 1966: 16-17.
LIE

em 5 ----- -----
New maths 'experiment' in secondary schools.
Tanzanian Math. Bull., v. 2, no. 2, June 1967: 36.

The new maths is an experiment in that the materials are being tried out and revised.

em 6 Brook, R. J.
Letter to the editor.
Tanzanian Math. Bull., v. 2, no. 1, Apr. 1967: 31-32.

Questions the advantage of the Entebbe maths definition of an angle.

em 7 Crabbe, J. R.
The teaching of geometry in schools - some suggestions.
Uganda Teach. J., v. 2, 1940: 124-130.
LIE

em 8 Hawkes, T. O.
A goal for group theory.
Tanzanian Math. Bull., v. 2, no. 1, Apr. 1967: 5-12.

Introduction; a programme for the classification of finite groups (problem of simple group classification; extension problem; isomorphism problem).

em 9 Heard, T. J.
The battle of Cape St. Vincent.
Tanzanian Math. Bull., v. 1, no. 1, May 1966: 29-32.

A description and mathematical analysis of the battle of Cape St. Vincent, 14th February 1797.

Kenya, Ministry of Education
Primary school syllabus.

See (es 101).

em 10 Linda, Sister
Treasurer's report for M.A.T.
Tanzanian Math. Bull., v. 2, no. 2, Aug. 1967: 1.

em 11 Magogwa, Barnabas Jumanne
The case against our traditional mathematics.
Tanzanian Math. Bull., v. 2, no. 2, Aug. 1967: 20-25.

Traditional mathematics has lacked freedom of investigation by the pupil and suffers from vague equivocal language of the subject material.

em 12 Mann, C. D., comp.
Mathematical conference report. January 1962.
Makerere Univ. College, Kampala, 1962. 74 p.

em 13 Mathematical Association of Tanzania
The Constitution of the Mathematical Association of Tanzania.
Tanzanian Math. Bull., v. 1, no. 1, May 1966: 33-35.

em 14 Mmari, G. R. V.
Mathematics clubs in secondary schools.
Tanzanian Math. Bull., v. 2, no. 2, Aug. 1967: 13-20.

Why form a maths club?; guiding principles of a maths club; organisation; activities; sources of ideas for a maths club; suggested topics for a maths club programme.

em 15 Muze, M. S.
The first Mathematical Association of Tanzania area meeting for Shinyanga, Mwanza, Mara, and West Lake regions.
Tanzanian Math. Bull., v. 2, no. 2, June 1967: 34-35.

Report of the meeting.

em 16 Muze, M. S.
New maths and its implementation in Tanzania.
Tanzanian Math. Bull., v. 2, no. 2, Aug. 1967: 26-31.

What is 'new maths'?; why teach new maths?; characterizing features of new maths; some steps for implementing new maths program in your school; some of the improved mathematics programmes now in progress in various parts of the world; bibliography.

em 17 Mwajombe, R. Z.
New maths in primary schools.
Tanzanian Math. Bull., v. 2, no. 2, June 1967: 30-33.

Review of the background and work of the new maths programme in Tanzania.

em 18 ----- -----
Why teach new maths.
Tanzanian Math. Bull., v. 2, no. 1, Apr. 1967: 2-5.

em 19 Peera, Z.
Report of the annual general meeting of the Mathematics Association of Tanzania.
Tanzanian Math. Bull., v. 2, no. 1, Apr. 1967: 27-30.

em 20 Phythian, J. E.
Chairman's report.
Tanzanian Math. Bull., v. 2, no. 1, Apr. 1967: 1, 33-36.

Report on the activities of the Association. Also points out problems in staffing and training with respect to the new maths programmes.

em 21 ----- -----
Fractions and operators.
Tanzanian Math. Bull., v. 1, no. 1, May 1966: 2-11.

Introduction; the rational number field; algebra of convolution; unit element; extension of the ring; references.

em 22 Phythian, J. E. and G. C. D. Sembuche
An analysis of the 1965 H.S.C. mathematics results.
Tanzanian Math. Bull., v. 2, no. 2, June 1967: 2-27.

A comparison of performances on the papers ofthe three different mathematics subjects in Kenya, Uganda, and Tanzania with inter-subject comparison between mathematics, physics, history, and geography. Statistics are given.

em 23 Roberts, J. B.
Some remarks about continued fractions.
Tanzanian Math. Bull., v. 1, no. 1, May 1966: 12-17.

em 24 Scopes, P.
Manipulation of directed numbers.
Tanzanian Math. Bull., v. 1, no. 1, May 1966: 22-25.

em 25 ----- -----
The plane table.
Tanzanian Math. Bull., v. 2, no. 1, Apr. 1967: 21-26.

Discussion on the use of the plane table at the primary school level. With examples.

em 26 Swinton, S.
On division by zero.
Tanzanian Math. Bull., v. 1, no. 1, May 1966: 26-28.

Notes on a lesson topic.

em 27 Tanzania Mathematics Project.
Institute of Education, University College, Dar es Salaam, June 1967. 13 p.

Mathematics panel; Mathematical Association of Tanzania; primary school (in-service training centers, syllabus, textbooks, expanding the project); secondary school (evaluating the project, syllabus); teacher's training college (T.C. maths tutor's seminar, ABCD institute).

em 28 The teaching of secondary mathematics.
Catholic University of America, Washington, D.C.

A survey of methods in East Africa.

Uganda, Government of
Primary school syllabus.

See (es 243).

em 29 Uganda, Ministry of Education
Junior secondary leaving and secondary entrance examination papers. 1960-1965.
Ministry of Education, Kampala, n.d. 156 p.

See particularly: Mathematics, 8-11, 26-28, 45-47, 65-69, 86-93, 125-139. No papers on science subjects.

em 30 Ukeje, B. Onyerisara
The Entebbe Mathematics.
Kenya Ed. J., v. 2, no. 7, Jan. 1966: 17+.
IEN, LIE

em 31 Webb, N. G. G.
Some problems in the introduction of School Mathematics Project for E. Africa to Form I.
Tanzanian Math. Bull., v. 2, no. 1, Apr. 1967: 13-20.

Materials; background of students; classroom design; variation in IQ; grouping difficulties; group activities; change in teaching method and effect on boys; the topics covered; speed; the S.M.P. book; the future.

em 32 Wenge, John
Leading to the new mathematics.
Tanzanian Math. Bull., v. 2, no. 3, Aug. 1967: 2-13.

Some of the events that led up to Godel's proof and some of the implications of his proof.

em 33 Woodhouse, D., ed.
Mathematics Institute 1966.
University College, Dar es Salaam, Feb. 1966. 117 p.

A comprehensive report of a mathematics institute for teachers held at the University College, Dar es Salaam, between January 3rd and 15th, 1966. The report falls into three sections: an introduction to the philosophy and ideas of Entebbe Mathematics; discussions on other mathematics projects, visual aids and programmed learning; and work in higher mathematics to give the teachers greater depth and background to their mathematics.

em 34 ----- -----, ed.
Mathematics Institute 1967.
University College, Dar es Salaam, Feb. 1967. 106 p.

A comprehensive report of the second annual mathematics institute for teachers held at the University College, Dar es Salaam between December 29th and January 11th, 1967. The purpose of the institute was to facilitate the introduction of more up-to-date mathematical topics into the first and second Forms of some of Tanzania's secondary schools. The report falls into two sections, the first on mathematics and mathematical background, the second general reports (progress report; S.M.P.E.A. in Kenya; the position of modern mathematics in Tanzania, and the way ahead; report of the annual general meeting of the Mathematics Association of Tanzania). With appendices.

em 35 ----- -----
Note on the problems.
Tanzanian Math. Bull., v. 1, no. 1, May 1966: 17, 21, 28, 32, 35.

Problems for solution using game-theoretical analysis.

em 36 Woodhouse, D.
A note on the problem of colouring maps.
Tanzanian Math. Bull., v. 1, no. 1, May 1966: 18-21.

CENTRAL AFRICA
(MATHEMATICS)

Black, A. A.
Mathematics and weather forecasting.

See (cs 30).

Eisler, H.

Correspondence education in the sciences and mathematics.

See (cs 69).

cm 1 Holmes, H.
The teaching of arithmetic.
N. Rhodesian Af. Ed. J., v. 1, no. 1, Jan. 1950: 10-12.
IEN, LIE, UZ

Malawi, Ministry of Education
Junior Certificate Syllabus, December, 1966.

See (cs 141).

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Primary school syllabus. 1966.

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School/university (continued)
, staffing cs 25, cs 132, em 20, es 7, es 8, ws 49
, structure g 59
School Mathematics Project
- see Curriculum development, programs
Science Center/s cs 46, cs 87, ws 150, ws 194, ws 263
, Domasi cs 111, cs 193, cs 200
, Nairobi es 32, es 40, es 41, es 68
, Nsukka g 28, ws 66
, University of Zambia cs 201
Science education
- see Education/al
Science fairs cs 162, cs 217, cs 243, es 85, es 89, es 111, es 114, es 116, es 120, es 132, es 191, es 221, es 296
Scientific community g 57, g 79
Scientific research es 34
Scottish Scheme for Junior Science
- see Curriculum development, programs
S.D.S.T.A.
- see Teacher/s, professional organisations
Sea hare ws 25
Secondary school teacher training
- see Teacher/s, training
Selection, natural cs 66
Semi-micro chemistry cs 187, es 211, es 256
Separation
- see Purification
Set (mathematical) g 46
Sex attractants es 225, es 232
Sex differences
, in concept formation ws 300
Sharks ws 137
Sickle cell ws 158
Significant figures ws 60
Silicone and silicones cs 5
Silviculture cs 77
Sixth form
- see Teaching
Slugs ws 25
S.M.P.
- see Curriculum development, programs
Smilax aspera L. ws 214
Snakes ws 54
Soil biology cs 70
Solubility es 2
Sonchus arvensis (yellow Sowthistle) cs 29
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Sowthistle, yellow (*Sonchus arvensis*) cs 29

Space sciecce es 215, es 295, ws 295
  - see also Astronomy
Spermatophyta cs 170
Staffing
  - see School/university
S.T.A.M.
  - see Teacher/s, professional organisations
S.T.A.N.
  - see Teacher/s, professional organisations
S.T.A.R.T.
  - see Teacher/s, professional organisations
Storage
  - see Laboratory
Striga cs 29
Structure
  - see Education/al
    School/university
Structure and function cs 169
Strychnos cs 191
Sulfur ss 3
Suppliers
  - see Equipment
Surveys
  - see Books
    Education/al
Swynnerton - Burtt memorial prize
  es 141
Syllabus cs 88
  , primary school cs 145, cs 176, cs 255, es 101, es 243, es 285, ss 1, wm 17, wm 27, ws 72
  , revision cs 20, cs 21, cs 79, es 31, es 84, es 172, es 183, es 203, es 219, es 285, es 293, ss 22, ws 4, ws 18, ws 45, ws 86, ws 87, ws 140, ws 142
  , secondary school ws 110, ws 179, ws 210, ws 215
    J.C. cs 24, cs 141, cs 175, cs 184, cs 256, ss 5, ws 42
    O-level ws 143
    S.C. es 31, es 172, es 285, es 293, ws 180, ws 221
  , sixth form
    A-level cs 23, cs 86, es 183, ws 4, ws 86, ws 87, ws 138, ws 140, ws 142, ws 143, ws 170, ws 225, ws 241, ws 315
    H.S.C. cs 20, cs 21, cs 104, es 219, es 285
  , subject
    biology cs 20, cs 21, cs 23, cs 86, cs 104, cs 141, cs 175, es 27, ss 5, ws 139, ws 140, ws 170, ws 179, ws 221, ws 225, ws 315

Syllabus
, subject (continued)
botany cs 86, ws 142
chemistry es 31, es 84, ws 4, ws 180, ws 241, ws 242
general science cs 140, cs 141, cs 145, cs 175, cs 256, es 101, es 243, ss 1, ss 5, ws 72, ws 110
health and hygiene cs 141, cs 176, es 243
mathematics cs 141, cs 145, cs 175, cs 176,cs 256, es 101, es 243, ss 1, wm 17, wm 27, ws 229
nature study cs 145, cs 176, ss 1
physics es 83, es 219, ws 227, ws 229
physics with chemistry cs 141
rural science cs 176, ws 210
zoology cs 86, ws 138, ws 142
, teacher training college ss 14
- see also Examination/s

Tananarive conference - 1962
- see Unesco
Taxonomy cs 59, cs 119, es 72, cs 76, ws 11, ws 234
Tea cs 70, cs 146
Teacher/s
, aims g 41
, experience of ws 289, ws 320
, professional organisations g 41, g 57
Association for Science Education in Central Africa
(A.S.E.C.A.) cs 6 - cs 25
East African Science Teachers' Association
(E.A.S.T.A.) es 245 - es 268
Federal Science Teachers' Association
(F.S.T.A.) cs 6 - cs 25
Ghana Association of Science Teachers
(G.A.S.T.) ws 73 - ws 110
Kenya Science Teachers' Association
(K.S.T.A.) es 103 - es 126
Mathematical Association of Ghana
(M.A.G.) wm 19
Mathematics Association of Tanzania
(M.A.T.) em 2, em 10, em 13, em 15, em 19, em 20, em 27
Mathematics Association of Zambia
(M.A.Z.) cs 245
Salisbury and District Science Teachers' Association
(S.D.S.T.A.) cs 6 - cs 25
Science Teachers' Association of Malawi
(S.T.A.M.) cs 202 - cs 205

Teacher/s
, professional organisations (continued)
Science Teachers' Association of the Republic of Tanzania (S.T.A.R.T.) es 203 - es 208
Science Teachers' Association of Nigeria (S.T.A.N.) ws 252 - ws 276
Uganda Science Teachers' Association (U.S.T.A.) es 245 - es 268
Zambia Association for Science Education (Z.A.S.E.) cs 244 - cs 254
, professional organisations, constitutions of cs 247, em 13, es 185, es 208
history of cs 224, es 119, ws 122, ws 133, ws 230
libraries of ws 78, ws 79, ws 113, ws 260
, promotion cs 25, cs 132
, qualifications g 41, ws 289, ws 320
, recruitment cs 25
, salaries cs 25, cs 132
, status ws 224
, training es 17, g 19, g 30, g 41, ws 150, ws 194, ws 283
curriculum ss 14
inservice em 27, em 33, em 34, es 100, ws 175
mathematics em 20, em 27, sm 6
primary em 27, ws 20, ws 157
problems in es 17, ws 20
science g 84
secondary cs 83
testing wm 9
Teaching
, aids em 32, es 199, es 258, ws 103, ws 289
film strips es 19, es 143, ws 67
films es 58, ws 314
reviews of ws 311 - ws 313
single concept ws 85
flannelboard cs 209
models es 86, es 153, ws 53, ws 154
microprojection es 62
pictures g 8, ws 293
publications wm 2
, aims and objectives cs 135, es 96, es 268, ss 10, ws 109, ws 146
biology cs 149
mathematics em 16, wm 19, wm 25
physics cs 37
primary science cs 215, es 70
teacher training cs 215, es 70
, in Asian schools es 47, es 176, es 177, es 187, es 188
, by correspondance cs 69

Teaching (continued)
  , in girls' schools cs 62, es 13, es 94, es 202
  , load g 67
  , methods cs 83, em 28, em 31, es 8, es 29, es 43, es 52, es 60, es 165, es 214, es 283, g 41, g 48, ws 68, ws 213, ws 320
  , notes
    astronomy cs 43, ws 244
    biology cs 138
    chemistry es 274 - es 277
    general science cs 150, cs 151, cs 240, cs 250 - cs 254, cs 257
    physical science es 10, es 160
    physics es 167, es 168, es 170, es 171
    physics with chemistry cs 142 - cs 144, es 11, es 161
    rural science ws 281, ws 282
  , in primary school (including middle school)
    mathematics subjects g 93, sm 7, wm 14, wm 20
    science subjects cs 28, cs 39, cs 81, cs 215, es 43, es 70, g 70, g 93, ss 16, ss 18, ws 65, ws 108, ws 161, ws 213, ws 239, ws 243
  , problems in es 157, es 198, es 209, g 39, g 71, ws 43, ws 199, ws 224, ws 307
    biological sciences es 142, es 235, ws 322, ws 323
    general science es 96, ws 167
    mathematical sciences em 30, sm 6, wm 4
    physical sciences cs 72, cs 73, cs 136, cs 216, cs 242, es 288, g 59
    - see also Language
  , by radio cs 96, cs 245, es 190, ws 41
  , science es 34, es 95, g 5, g 10, g 47, ss 11, ws 37, ws 38, ws 115, ws 128, ws 182, ws 208
  , in secondary school
    biology cs 180, es 162, g 54, ws 188, ws 193, ws 287
    chemistry es 29, es 134, ss 6, ws 119
    general science ws 320
    mathematics cs 161, em 28, g 94, wm 18
    nature study ws 46, ws 47, ws 50
    physics cs 27, cs 37, es 165, es 176, g 98, ws 306
  , in sixth form es 268, ws 146, ws 199
    biology cs 86, cs 149, es 155, ws 27
    botany cs 86, ws 322, ws 323
    chemistry cs 214, cs 216, ws 85
    mathematics wm 26, ws 305
    physics cs 37, ws 58, ws 305
    zoology cs 86

Teaching (continued
, specific subjects (level not specified)
arithmetic cm 1, cm 2, cm 3, wm 6, wm 7, wm 16
astronomy ss 9
biology es 27, es 289, ws 57, ws 171, ws 193
chemistry cs 206, es 34, ws 85
earth science g 79, g 80, ss 9
geometry em 7
mathematics cs 161, wm 5, wm 23
natural science g 64
nature study cs 94, cs 190, ws 6, ws 17, ws 52, ws 71, ws 178, ws 201, ws 223, ws 233, ws 280, ws 299
physics es 165, ss 2
rural science ws 3, ws 61
, specific topics
air cs 211, cs 225
Archimedes' principle ws 118
biological populations ws 168
Boyles law es 88
convection currents cs 107
current and current flow ws 304
division by zero em 26
ecology cs 97, es 73, es 77, es 140, es 223, es 224, es 235, ws 26, ws 166, ws 184, ws 202, ws 288, ws 297
elasticity es 210
electricity cs 122
electrolysis cs 34
equivalent weight cs 208
evolution ws 39, ws 160, ws 181
extension of springs es 165
flotation cs 210
force cs 234, es 163
ions cs 124
laboratory equipment, names of cs 115
light cs 121, es 297, ws 162
magnetism cs 49, cs 123
mechanics ws 238
modern physics es 288
osmosis es 156
periodic table es 159
photosynthesis es 272
refraction cs 83
respiration es 57, es 273
salts cs 113
sets (mathematical) g 46
water, hard and soft es 134
, by television es 190, g 84, ws 211

Teaching (continued)
  , in university — es 173, es 181, g 59, g 85, g 86, g 88, g 89, ws 21, ws 69, ws 148, ws 176, ws 302
Technical education
  - see Education/al, technical
Technicans, laboratory
  - see Laboratory, assistants
Tecoma stans — es 184
Telescope, reflecting — cs 186
Television
  - see Teaching
Termites — es 63, es 143, es 200
Thermit reaction — cs 64
Thermometer — es 95
Time — cs 4, es 70, ws 300
Titration — es 28, ws 207
Toad, African square-marked (*Bufo regularis*) — es 154
Training
  - see Teacher/s
Translocation — ws 298

Unesco — g 75 - g 94
  , Abidjan conference - 1960 — g 4, g 75
  , Addis Ababa conference - 1961 — g 76 - g 78
  , Lagos conference - 1964 — g 1, g 57, g 64, g 66, g 79 - g 83
  , Meeting of science and mathematics teachers of special fund colleges, Abidjan - 1964 — g 39, g 65, g 84, g 93, g 100
  , Rabat conference - 1962 — g 85, g 86
  , Tananarive conference - 1962 — g 37, g 87 - g 89
  , Unesco project on new approaches and techniques in biology teaching in Africa
    - see Curriculum development, programs
  , Working party on the secondary school curriculum in Africa — g 90, g 91
U.S.T.A.
  - see Teacher/s, professional organisations
Utricularia (Bladderwort) — ws 263
University
  - see Teaching
University of Zambia, Science Centre
  - see Science center/s

Van de Graaf generator — cs 118
Vectors — ws 62
Venus — cs 220

Village science cs 44, cs 47, cs 48, cs 109, cs 125, cs 147, cs 159, cs 168, g 40, ws 306
- see also environment

Voltameter
- see Electrolysis

W.A.E.C.
- see examination/s, organisations

Wave machine es 217, es 280
Waves cs 212, es 253
Weather cs 30, cs 182, ws 70, ws 114, ws 205
Weather vane ws 205
Weeds ws 174
Weighing ws 236
Wheatstone bridge es 253
Witchcraft and magic cs 228, g 68, ws 159
Working party on the secondary school curriculum in Africa
- see Unesco

Worms ws 54
Writing
- see Books

Yeast ws 226
Yellow sowthistle (*Sonchus arvensis*)

Zambia Association for Science Education
- see Teacher/s, professional organisations

Z.A.S.E.
- see Teacher/s, professional organisations

Zoo es 289

APPENDIX 3

KEY TO LIBRARIES AND INSTITUTIONS

The following is a guide to the code letters of the libraries and institutions which are referred to in this work. A letter code in parenthesis follows the name of some of the libraries or institutions. This code is intended as an indication of the nature and facilities of the institution. The key to the code is given below.

The libraries and institutions are grouped according to whether they are in Africa, Great Britain, or the United States. This list is not intended to be exhaustive, but merely to give an indication of where some of the materials are to be found.

L = the library lends serials.

L* = the library restricts its lending of serials or does not lend. Application should be made in each case.

P = the library furnishes photocopies.

P* = the library does not furnish photocopies.

M = the library furnishes microfilms.

M* = the library does not furnish microfilms.

A = the library permits access to callers in general.

A* = the library permits access to persons suitably introduced.

AFRICA

CODE	LIBRARY OR INSTITUTION
BLS	The Library, University of Botswana, Lesotho and Swaziland, Roma, Lesotho. (L, P, M*, A)
CCG	The Library, University College of Cape Coast, Ghana. (L*, P, A)
CCM	The Library, Chancellor College, Limbe, Malawi. (L*, M*, A)
FBC	Fourah Bay College Library, University of Sierra Leone, Freetown, Sierra Leone. (L*, P, A)
MAK	Makerere University College Library, Kampala, Uganda. (L*, P, M, A)

MIE	Institute of Education Library, Makerere University College, Kampala, Uganda. (L*, P, M, A)
RCA	The Library, Unesco Regional Centre for Educational Information and Research in Africa, Accra, Ghana. (L*, P*, M*, A*)
UCD	The Library, University College, Dar es Salaam, Tanzania. (L*, P, M, A)
UCN	The Library, University College, Nairobi, Kenya (L*, P, M, A*)
UI	The Library, University of Ibadan, Ibadan, Nigeria. (L, P, A*)
UZ	The Library, University of Zambia, Lusaka, Zambia. (L*, P, M*, A*)

UNITED KINGDOM

CODE	LIBRARY OR INSTITUTION
ASE	The Secretary, Association for Science Education, **Hatfield** , England. (Not a formal library, P*, M*, A*)
BC	The British Council Science Library, Albion House, 59 New Oxford St., London, England. (L*, P*, M*, A*)
BnU	The Library, University College of North Wales, Bangor, Wales. (L, P, A*)
BU	The Library, University of Birmingham, Birmingham, England. (L, P, A*)
COL	Commonwealth Office Library, Sanctuary Buildings, Great Smith St., London, England. (Formerly known as the Colonial Office Library). (P, A)
E	National Library of Scotland, Edinburgh, Scotland. (L*, P, A*)
GU	Glasgow University Library, Glasgow, Scotland. (L, P, A*)
L	British Museum, London, England. (L*, P, A*)
LCR	The Library, Institute of Commonwealth Studies, University of London, London, England. (L*, P*, A*)
LIE	The Library, Institute of Education, University of London, London, England. (L*, P, A*)

LOS	The Library, School of Oriental and African Studies, University of London, London, England. (L, P, A*)
LSH	Senate House Library, University of London, London, England. (L*, P, A*)
O	Bodleian Library, University of Oxford, Oxford, England. (L*, P, A*)
OVA	Overseas Visual Aids Centre (O.V.A.C.), Tavistock House South, Tavistock Square, London, England. (No formal library)
SwU	The Library, University College of Swansea, Swansea, Wales. (L, P*, A*)

UNITED STATES OF AMERICA

CODE	LIBRARY OR INSTITUTION
CL	Los Angeles Public Library, Los Angeles, California, U.S.A. (L*, P, M, A)
CLU	The Library, University of California at Los Angeles, Los Angeles, California, U.S.A. (L, M, P)
CUR	The Library, University of California at Riverside, Riverside, California, U.S.A. (L, P)
ICU	The Library, University of Chicago, Chicago, Illinois, U.S.A. (L*, P, M, A)
IEN	The Library, Northwestern University, Evanston, Illinois, U.S.A. (L*, P, M)
KU	The Library, University of Kansas, Lawrence, Kansas, U.S.A. (L, P, M)
LC	The Library of Congress, Washington, D.C., U.S.A. (L*, P, M, A)
MCM	The Library, Massachusetts Institute of Technology, Cambridge, Massachusetts, U.S.A. (P, M)
MWC	The Library, Colby College, Waterville, Maine, U.S.A.
NN	New York Public Library, New York, New York, U.S.A. (P, M, A)
NC	The Library, Columbia University, New York, New York, U.S.A. (L*, P, M)

NCL	Law Library, Columbia University, New York, New York, U.S.A.	(L*, P, M)
NCT	The Library, Teachers College, Columbia University, New York, New York, U.S.A.	(L, P, M)
NSU	The Library, Syracuse University, Syracuse, New York, U.S.A.	(P)
OCU	The Library, University of Cincinati, Cincinati, Ohio, U.S.A.	(L, P)
OU	The Library, Ohio State University, Columbus, Ohio, U.S.A.	(L*, P, M)

APPENDIX 4

LIBRARY AND INSTITUTIONAL HOLDINGS

This appendix is divided into two sections. The first section contains information on publications specifically dealing with science and mathematics education in Africa, e.g. the publications of teachers' professional organisations. The second section refers to publications which contain information dealing with science and mathematics education, but which are not specifically oriented either towards Africa or science and mathematics education. The publications listed in this section were chosen on the basis of the frequency of occurence of relevant articles.

Libraries or institutions which are known to hold the publication indicated are listed by a letter code. The key to the letter code is contained in Appendix 3. In many cases the libraries or institutions were personally searched by the author. Where this was not possible, particularly with respect to some of the libraries in Africa, an extensive questionnaire was submitted to the libraries concerned.

All of the publications listed in section one are technically irregular serials. Hence, the author has felt it necessary to list them issue by issue with information given as completely as possible. All the holdings for the libraries and institutions listed in this section were ascertained either by a personal check or by questionnaire. It should be noted that in many cases the main library in the country of origin of the publication does not hold the publication. It is hoped that the information provided will assist in acquisition of these publications. As a means of assistance to those who may wish to continue work with these publications in the future, information is given on whether particular issues of a publication have been annotated (and listed), listed - but not annotated, or not listed at all in the body of this bibliography.

In section two, the use of the terms partial, extensive, and complete is only intended as a general indication to the extent of the holdings of a particular library or institution. An asterisk (*) appearing after these terms indicates that the information on the holdings have been inferred from standard sources and have not been otherwise checked by the author.

Finally, it must be emphasised that the information contained in this appendix should be used only as a general indication of the holdings of a particular library or institution. Libraries are continually receiving back issues of publications and it is to be hoped that the information contained in this appendix will quickly go out of date.

Bulletin of the Ghana Association of Science Teachers

(i) Ghana Association of Science Teachers Bulletin

Vol.	No.	Date	Impression	Editor	ASE	LIE	RCA	UI	Annotated
1	1	June 1959	mimeo.	J. K. Lamptey			x		x
1	2	Dec. 1959	mimeo.	J. K. Lamptey			x		x

(ii) G.A.S.T. Bulletin

Vol.	No.	Date	Impression	Editor	ASE	LIE	RCA	UI	Annotated
2	1	June 1960	print.	J. K. Lamptey			x	x	x
2	2	Dec. 1960	print.	J. K. Lamptey			x	x	x
3	1	Mar. 1961	print.	J. K. Lamptey			x		x
4*	2	Oct. 1961	print.	J. K. Lamptey	x		x	x	x
4	1	Apr. 1962	print.	T. Gray	x		x	x	x
4	2	Oct. 1962	print.	T. Gray	x		x		x
5	1	Apr. 1963	print.	T. Gray			x	x	x
5	2	Oct. 1963	print.	T. Gray			x	x	x

- publication ceased for three issues -

(iii) Bulletin of the Ghana Association of Science Teachers

Vol.	No.	Date	Impression	Editor	ASE	LIE	RCA	UI	Annotated
6	2	Oct. 1965	print.	J. D. Hallett	x		x	x	x
7	1	Apr./July 1966	print.	F. E. Watson		x	x		listed/not annotated
8	1/2	Jan./July 1967	print.	B. S. Kaushiva			x		not listed

*Note: This volume was incorrectly numbered.

Journal of the Association for Science Education in Central Africa

(i) Proceedings of the Salisbury and District Science Teachers' Association

Vol.	No.	Date	Impression	Editor	ASE	Annotated
		1957	mimeo.	D. S. Harris		x

(ii) Journal of the Salisbury and District Science Teachers' Association

Vol.	No.	Date	Impression	Editor	ASE	Annotated
2	1	1958	mimeo.			x
3	1	1959	mimeo.			x

(iii) Federal Science Teachers' Journal

Vol.	No.	Date	Impression	Editor	ASE	Annotated
1	1	1960	print.			x
2	1	1961	print.	G. T. Jones		x
3	1	1962	print.	G. T. Jones		x

(iv) Journal of the Association for Science Eduction in Central Africa

Vol.	No.	Date	Impression	Editor	ASE	Annotated
4		1963	print.	G. T. Jones	x	x
	- no publication in 1964 -					
5		1965	print.	G. T. Jones, et. al.	x	x

Journal of the Science Teachers Association of Nigeria

Vol.	No.	Date	Impression	Editor	ASE	BC	RCA	Annotated
3	3	Nov. 1964	print.				x	not listed
4	1	Mar. 1965	print.				x	listed/not annotated
5	1	Jan. 1966	print.		x		x	listed/not annotated
5	2	May 1966	print.	D. Oyewole	x			x
5	3	Oct. 1966	print.	D. Oyewole	x		x	x
5	4	Dec. 1966	print.	D. Oyewole	x		x	x
6	1	May 1967	print.	D. Oyewole		x	x	x
6	2	Aug. 1967	print.	D. Oyewole				x

Note: At the time of final compilation (early 1968/late 1967) no further information could be obtained on earlier issues of this journal. The libraries indicated could not furnish further information.

Kenya Science Teachers' Association [Bulletin]

(i) K.S.T.A. Bulletin

Vol.	No.	Date	Impression	Editor	ASE	UCN	Annotated
		[1962]	mimeo.				listed/not annotated
- information on intervening issues not available -							
2	3	Nov. 1963	mimeo.	L. S. Martins			x
Conf. Issue		[Jan.] 1963	mimeo.	L. S. Martins			x
		May 1964	mimeo.		x		listed/not annotated

(ii) Kenya Science Teachers' Bulletin

Vol.	No.	Date	Impression	Editor	ASE	UCN	Annotated
3	4	Sept.1964	mimeo.	F. Aluta/M. Stimac			x
4	1	Jan. 1965	mimeo.	M. Stimac			x
		May 1965	mimeo.		x		listed/not annotated
3*	3	May 1966	mimeo.				x

(iii) Kenya Science Teachers' Association [Bulletin]

Vol.	No.	Date	Impression	Editor	ASE	UCN	Annotated
		Mar. 1967	mimeo.	A. Glover		x	x

*Note: This volume was incorrectly numbered.

Malawi Science Teacher

Vol.	No.	Date	Impression	Editor	ASE	BC	CCM	NSU	RCA	Annotated
1	1	June 1965	print.	N. Usher/S. Moss	x	x	x	x		x
1	2	Nov. 1965	print.	N. Usher	x	x	x	x		x
2	1	Mar. 1966	print.	N. Usher			x	x		x
2	2	.1966*	print.	I. Taylor			x			x
3	1	Sept.1967	print.	I. Taylor			x		x	x

*Note: This Issue was sent out in July 1967.

Science Education News (Zambia)

Vol.	No.	Date	Impression	Editor	Annotated
	1	[Mar. 1967]	mimeo.	J. M. Needham	x
	2	[July 1967]	mimeo.	J. M. Needham	x
	3	[Dec. 1967]	mimeo.	J. M. Needham	x

Science Newsletter (U.B.L.S.)

Vol.	No.	Date	Impression	Editor	BLS	LIE	RCA	Annotated
1	1	Dec. 1965	mimeo.			x	x	listed/not annotated
1	2		mimeo.					not listed
1	3	Oct. 1966	mimeo.			x	x	listed/not annotated
2	1	July 1967			x		x	x
2	2	Nov. 1967						x

Science Teachers' Association of the Republic of Tanzania Journal

Vol.	No.	Date	Impression	Editor	ASE	MAK	MIE	RCA	UCD	UCN	Annotated
1	1	Sept.1963		S. C. Gautam	x			x	x		(listed/not
2	1	Jan. 1964		S. C. Gautam				x	x		(annotated
2	2	Apr. 1964		S. C. Gautam					x		(listed/not
2	3	Aug. 1964		S. C. Gautam				x	x		(annotated
A.G.M. Supp.		Dec. 1964		S. C. Gautam					x		x
		1965 (y)*		R. G. Thomas	x				x		x
		Nov. 1965	print.	R. G. Thomas					x		x
		Mar. 1966	print.	J. F. Evans	x				x		x
		July 1966	print.	J. F. Evans	x	x	x		x		(listed/not annotated
		Dec. 1966	print.	J. F. Evans	x	x	x		x		x
		June 1967	print.	J. F. Evans		x	x		x	x	x

*Note: The color of the cover (yellow) is the only means of identifying this issue.

Science Teachers' Journal

(i) E.A.S.T.A. Journal

Vol.	No.	Date	Impression	Editor	ASE	MAK	MIE	Annotated
1	1	Sept.1959	mimeo.	H. Creaser		x		x
1	2	Dec. 1959	mimeo.	H. Creaser		x		x
1	3	Apr. 1960	mimeo.	H. Creaser		x		x

(ii) Science Teachers' Journal

Vol.	No.	Date	Impression	Editor	ASE	MAK	MIE	Annotated
1	4	1960	mimeo.	H. Creaser		x	x	x
1	5	[Aug.]1961	mimeo.	H. Creaser, et. al.		x	x	x
1	6	Nov. 1963	mimeo.		x	x	x	x
		June 1965	print.	J. R. Hall	x		x	x
		Dec. 1965	print.	J. R. Hall			x	x
		July 1966	print.	P. A. Whittle	x			x
		Dec. 1966	print.	P. A. Whittle	x	x		x
		July 1967	print.	P. A. Whittle				x
		Dec. 1967	print.	P. A. Whittle				not listed

The Uganda School Science Review

Vol.	No.	Date	Impression	Editor	MAK	Annotated
2	1	Mar. 1953	mimeo.		x	x

E.S.I. Quarterly Report

Note: Educational Services Incorporated (U.S.A.) has changed its name to Educational Development Center.

MCM	complete*
MIE	partial
MWC	complete*
UI	partial

Ghana Teachers' Journal

Formerly known as Gold Coast Education (no. 1, May 1952 - no. 3, Sept. 1954).
Name changed to Gold Coast Teachers' Journal (no. 1, 1955 - no. 4, Oct. 1957).
Name changed to Ghana Teachers' Journal (no. 1, Jan. 1958 -).
Note: Sequential volume numbering began with v. 18, no. 2, Apr. 1958. There were nineteen issues previous to the publication of v. 18, no. 2, Apr. 1958.

CCG	no. 1, May 1952 -	complete
CLU	1952 -	complete*
FBC	no. 1, May 1952 -	complete
GU	1952 -	complete*
IEN	1952 -	complete*
L	1952 -	complete*
LC	no. 1, Jan.1953 -	extensive
LIE	no. 1, May 1952 -	complete
MIE	no. 1, May 1952 -	extensive
NCT	1952 -	complete
O	1952 -	complete*
OU	1954 -	extensive*
RCA	v. 25, no. 1, Jan. 1960 -	partial
UCD	no. 1, Jan. 1957 -	extensive
UI	no. 3, Dec. 1955 -	extensive

Gold Coast Education

See Ghana Teachers' Journal.

Gold Coast Teachers' Journal

See Ghana Teachers' Journal.

Nigeria

Formerly known as Nigerian Teacher (v. 1, no. 1, 1934 - no. 8, Sept. 1936).
Name changed to Nigeria (no. 9, Jan. 1937 -).
Note: Articles on education ceased to appear in this publication in the latter part of the nineteen fourties.

LC		extensive
LIE		extensive
UI	v. 1, no. 1, 1934 -	complete
UZ	no. 14, June 1938 -	partial

Nigerian Teacher

See Nigeria.

Northern Rhodesian African Education Journal

Note: Ceased publication with v. 7, no. 2, 1962.

IEN	v. 1, no. 1, Jan. 1950 -	complete*
L	v. 4, no. 1, 1955 -	partial*
LC	v. 7, no. 1, 1960/61 -	partial
LIE	v. 1, no. 1, Jan. 1950 -	complete
UZ	v. 1, no. 1, Jan. 1950 -	extensive

Oversea Education (U.K.)

CCG	extensive
FBC	extensive
LC	extensive
LIE	complete
NSU	partial
RCA	partial
UCD	complete
UCN	partial
UI	complete
UZ	extensive

Science Education (U.S.A.)

CCG	partial
LC	complete
NSU	extensive
SwU	partial*
UCN	partial
UZ	partial

Teacher Education (U.K.)

BLS	complete
CCG	partial
CCM	partial
CUR	complete*
FBC	extensive
IEN	complete*
LC	complete
LIE	complete
MAK	extensive
NCT	complete*
O	complete*
RCA	complete
SwU	complete*
UCD	complete
UCN	complete
UI	partial
UZ	partial

West African Journal of Education

BLS	v. 2, no. 3, Oct. 1958 -	partial
CCG	v. 3, no. 1, Feb. 1959 -	partial
CCM	v. 8, no. 2, June 1964 -	partial
E	v. 1, no. 1, Feb. 1957 -	complete*
FBC	v. 1, no. 1, Feb. 1957 -	complete
ICU	v. 1, no. 1, Feb. 1957 -	complete*
IEN	v. 1, no. 1, Feb. 1957 -	complete*
L	v. 1, no. 1, Feb. 1957 -	complete*
LC	v. 1, no. 1, Feb. 1957 -	extensive
LIE	v. 1, no. 1, Feb. 1957 -	complete
MIE	v. 2, no. 2, June 1958 -	partial
O	v. 1, no. 1, Feb. 1957 -	complete*
RCA	v. 1, no. 1, Feb. 1957 -	extensive
UCD	v. 2, no. 1, Feb. 1958 -	extensive
UCN	v. 3, no. 2, June 1959 -	extensive
UI	v. 2, no. 1, Feb. 1958 -	partial
UZ	v. 9, no. 1, Feb. 1965 -	partial

APPENDIX 5

BIBLIOGRAPHIES, CATALOGUES, AND LIBRARIES SEARCHED

The following is a listing of bibliographies, library catalogues and libraries which were searched in the course of compilation of the bibliography. This listing is not complete in that some of the original notes were inadvertently lost. However, it is hoped that the list will at least assist anyone who wishes to make a further search of the literature in the future.

Where applicable, the materials were searched through December 1966. Some of the materials were followed through until August 1967.

In addition, certain libraries themselves were searched. The African libraries were visited in November 1967. These libraries are listed under the name of the library.

Sources which were found to be particularly valuable are indicated with an astrisk.

*Africa (Journal of the International African Institute)
- contains an excellent bibliography at the back of each issue.

*African Education and Development Since 1960: A Select and Annotated Bibliography. Hanson, J. W. and G. W. Gibson, Michigan State University, 1960.
- contains a short section on science education.

Agency for International Development, Washington, D.C. U.S.A.

*Association for Science Education, **Hatfield** , England.
- have one of the few collections of African science teacher's association journals in existence.

Bibliography of the Scientific Literature of Liberia, Briscoe, M. S., Washington, D.C., 1963.

Bibliography on Educational Planning, Unesco, Paris, (WS/0164.245), 1963. 96 p. mimeo.

Bibliography on Special Problems in Education in Tropical Africa, Yates, B. A. comp., Ed. Rev., v. 8, 1964: 304-309.

Boston University, African Studies Library, Boston, U.S.A.

British Council Science Library, London, England.

British Education Index (v. 1, Aug. 1954 - v. 5, Dec. 1966).

British Museum Library, London, England.

Catalogue of African Government Documents - African Area Index. Boston University.

Catalogue of the African Collection - Northwestern University Library.

Catalogue of the Colonial Office Library - Post 1950.

Catalogue of the Colonial Office Library - Pre 1950.

Catalogue of the Peabody Museum - Harvard University.

Chancellor College Library, Limbe, Malawi.

*Commonwealth Office Library, London, England.
  - used to be known as the Colonial Office Library.

Comparative Education Review (v. 1, 1957 - v. 10, 1966).

Dictionary Catalogue, University of California Library, Los Angeles, U.S.A.

Dictionary Catalogue of the Schomburg Collection of Negro Literature and History - New York Public Library.

Education Index (v. 1, Jan. 1929 - v. 16, June 1966)

Educational Policy and Practice in Tropical Africa - A General Bibliography. Yates, B. A., comp., Ed. Rev., v. 8, no. 2, Oct. 1964: 215-228.

General Bibliography of the Republic of Liberia. Solomon, M. D. and W. L. d'Azevedo, Northwestern University, Working Papers in Social Science No. 1, 1962.

Health, Education and Welfare, Department of, Washington, D.C., U.S.A.

H.M.S.O. Publications Lists.

Library Catalogue - School of Oriental and African Studies - University of London (v. 15, Africa).

Library Listing for the Harvard Center for Studies in Education and Development (Aug. 1963 - Apr. 1966).

*Library of Congress, Washington, D.C., U.S.A.

List of American Doctoral Dissertations on Africa. General Reference and Bibliography Division, Library of Congress, Washington, D.C., 1962. 69 p.

*Makerere University College, Main Library, Kampala, Uganda.

*Makerere University College, Institute of Education Library, Kampala, Uganda.

Nairobi Curriculum Development Centre, Nairobi, Kenya.

Nigerian Official Publications, 1869 - 1959: A Guide. Conover, H. F., Library of Congress General Reference and Bibliography Division, Washington, D.C., 1959. 153 p.

Nigerian Publications (1950 - 1966). University College Library, Ibadan, Nigeria.

Official Publications of British East Africa.
    Part I. East Africa High Commission and other Regions Documents.
    Part II. Tanganyika.
    Part III. Kenya and Zanzibar.
    Part IV. Uganda.
Library of Congress General Reference and Bibliography Division, Washington, D.C., U.S.A.

Public Affairs Information Service (PAIS).

The Rhodesias and Nyasaland: A Guide to Official Publications. Walker, Audrey A., Library of Congress General Reference and Bibliography Division, Washington, D.C., 1965. 285 p.

Serials for African Studies. Conover, Helen F., Library of Congress General Reference and Bibliography Division, Washington, D.C., 1961. 163 p.

Syracuse University Library, Syracuse, New York, U.S.A.

Theses on Africa (Accepted by Universities in the United Kingdom and Ireland). Standing Conference on Library Materials on Africa (SCLOMA), W. Heffer and Sons, Cambridge, England, 1964.

*University College, Dar es Salaam, Tanzania.

University College, Nairobi, Kenya.

University of London, Institute of Education Library, London, England.
  - probably contains the best single library collection of materials in existence at this time.

University of London, Senate House Library, London, England.

University of Zambia, Lusaka, Zambia.